21 DECEMBER 1951 ONE SHILLING

FLIGHT

and

AIRCRAFT ENGINEER

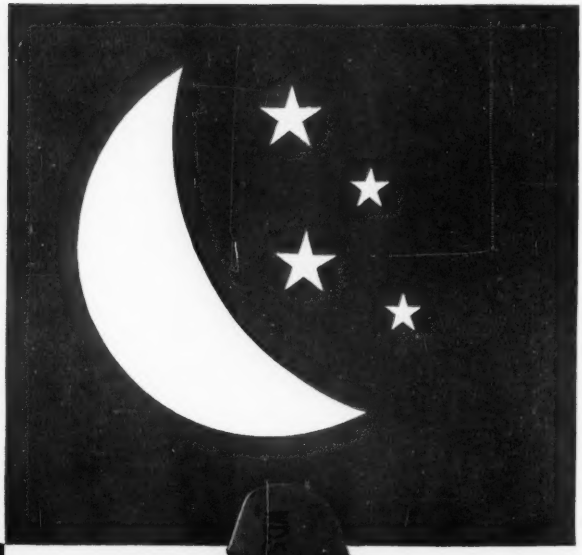
OFFICIAL ORGAN OF THE ROYAL AERO CLUB

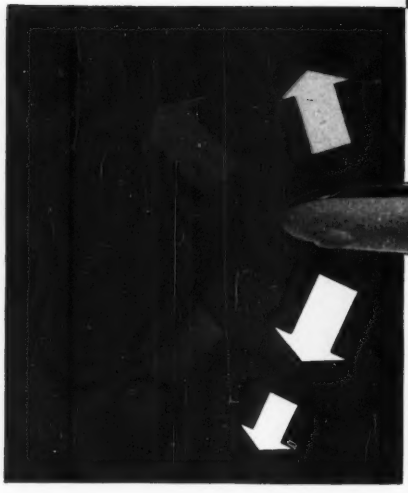
Christmas Greetings and Best Wishes

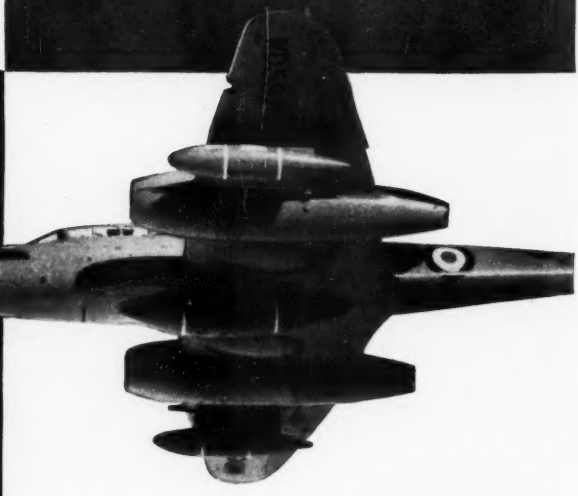
for the New Year

from WESTLAND AIRCRAFT LTD., YEOVIL, ENGLAND

Flying Radar Station...







ARMSTRONG WHITWORTH

N.F.11

Sweeping the night skies at very high altitudes, the Armstrong Whitworth N.F.11 uses elaborate radar gear to spot its quarry. This aircraft, backbone of Western European night fighter defence, is now in production for the R.A.F. Flying at speeds greater than any known night fighter, its ventral and wing-tip fuel tanks provide exceptionally long range. The four 20 mm. cannon in the wings make the N.F.11 the deadliest night fighter operating today.

MEMBER OF THE HAWKER SIDDELEY GROUP

The National Gallery designed by William Wilkins was built in 1832-38. The approach to the building from Trafalgar Square is up an imposing flight of stone steps to a portico, the columns of which originally formed part of the old Carlton House.

STEP BY STEP over the last ninety-six years Terry's research has led the world in the development of springs and presswork. Today, this vast store of experience is freely available to all who are faced with fresh problems in this highly specialised field of engineering. If at any time *you* require advice on springs or presswork, Terry's research department will always be glad to help you.

Step by step **TERRY'S** *have pioneered the development of*

SPRINGS & PRESSWORK

Φ16 HERBERT TERRY & SONS LIMITED, REDDITCH, ENGLAND

A

Do you know your airfields?

17

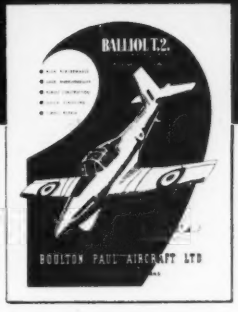
Recognise this airfield? It's No. 17 in this series of puzzle photographs. You'll find the answer below on the right ★

You may be flying twenty supporters to a football match, or a hundred cases of drugs to cope with an epidemic—no matter what your load, what size your aircraft, the friendly crews of the Shell and BP Aircraft Servicing Vehicles are always ready, to give you quick, efficient service at twenty-five aerodromes in Britain.

Shell and BP Aviation Service

Shell-Mex and B.P. Ltd., Shell-Mex House, Strand, W.C.2.
Distributors in the U.K. for the
Shell and Anglo-Iranian Oil Groups.

Prestwick ★



Supreme flying qualities, versatility, robust construction, exceptional serviceability—all these contribute to the Balliol's unchallenged fitness for the purpose for which it was designed.

BOULTON PAUL AIRCRAFT LTD.

WOLVERHAMPTON ENGLAND

Greetings

and

Good Wishes

for

Christmas and the coming year

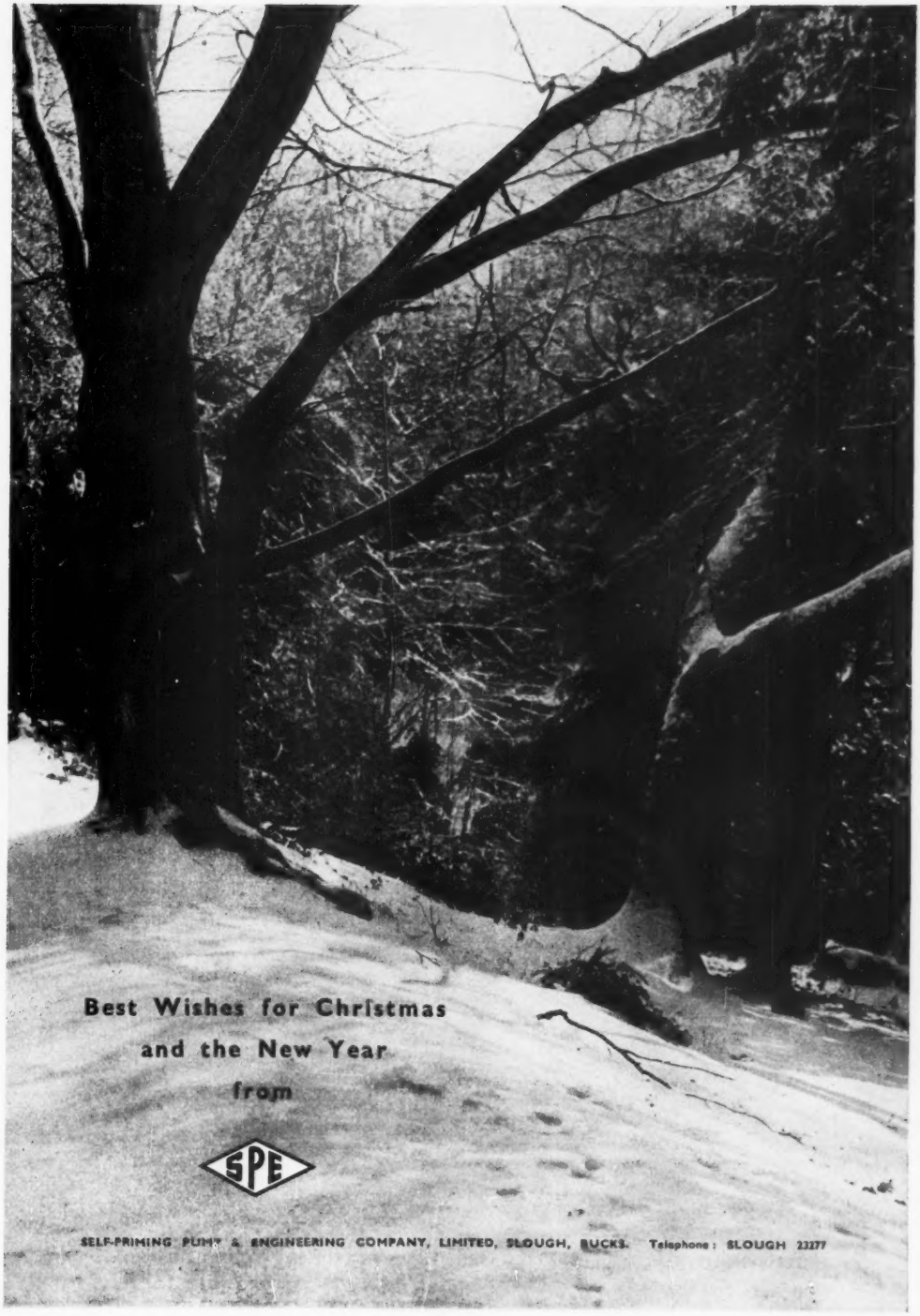
to all our friends

in the Aircraft Industry

from

TITANINE

COLINDALE LONDON N·W·9

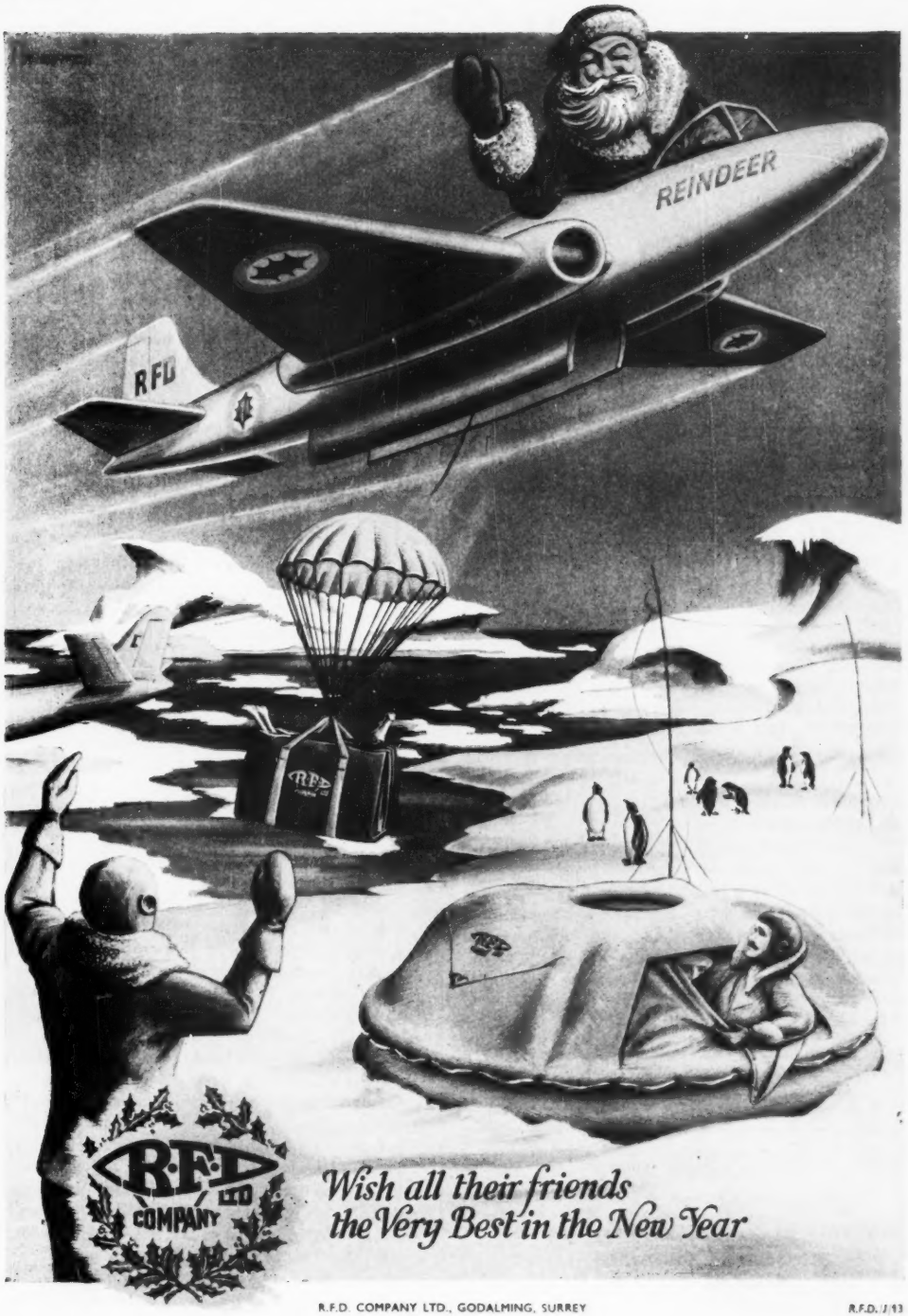

Best Wishes for Christmas
and the New Year
from
SPE
SELF-PRIMING PUMP & ENGINEERING COMPANY, LIMITED, SLOUGH, BUCKS. Telephone: SLOUGH 23277

Greetings . . .

To all our friends throughout the Services and the Aircraft Industry we send the Compliments of the Season . . . A very Merry Christmas and a Happy New Year.

Teddington CONTROLS

TEDDINGTON CONTROLS LTD., CEFN COED, MERTHYR TYDFIL, SOUTH WALES. Merthyr Tydfil 666.



R.F.D. COMPANY LTD., GODALMING, SURREY R.F.D. J/13

FLY in the Royal Navy

DURING NATIONAL SERVICE OR ON SHORT SERVICE COMMISSION

The most memorable years of your life will be those you spend flying as an officer in the Royal Navy . . . teamed up with men chosen out of thousands for a job that calls for everything . . . a well-paid job in the country's first line of defence. If you are the kind of young man who seizes exceptional opportunities, and you have the qualifications shown below, apply now for full details :

ON NATIONAL SERVICE. You can qualify for a R.N.V.R. Commission, with good flying pay and the chance of foreign travel; and the opportunity to serve a further 2 years and receive a gratuity of up to £525 tax free, or longer with higher gratuity or a good chance of a permanent commission.

ON SHORT SERVICE COMMISSION. Alternatively, you can qualify for a R.N. eight-year Commission, Pilot or Observer, with a one in five chance of a permanent Commission. Lieutenants of 2 years' seniority can earn about £625 and all found (nearly £1,000 if married and 25 years of age). Gratuities up to £1,500 tax free after 8 years.

Candidates should be between 17 and 24 years old ; physically fit ; hold School Certificate with pass in maths., or General Certificate of Education with pass at ordinary level in English, maths. and one optional subject. For full details write to Secretary of the Admiralty C. W. Branch (BN/71), Queen Anne's Mansions, London, S.W.1, for brochure "Fly with the Royal Navy", or send the coupon below.

Former naval pilots and observers up to 33 years of age can re-join for 4 to 8 years with similar gratuities.

To Secretary of the Admiralty, C.W. Branch (BN/71), Queen Anne's Mansions, London, S.W.1.

Please send me, without obligation, a FREE copy of **'FLY WITH THE ROYAL NAVY'.**

Name .....

Address .....

Lockheed

BEGINS WORK ON GIANT JET BOMBER

Production of an undisclosed number of giant B-47 jet bombers has begun at Lockheed's Marietta, Georgia, factory.

As the world's leading producer of jet aircraft and modern high-speed transports, Lockheed is especially qualified to build the Boeing-designed B-47's for the Air Force. Production floor space at Marietta, plus Lockheed's California factories, makes Lockheed as large today as the entire U.S. air-frame industry in 1940.

What's going on at Lockheed?

Lockheed has developed a high-speed camera with a speed range of from 1,000 to 3,000 frames a second. At 3,000 per second, a 100-foot roll of 16-mm film goes through the camera in 1¼ seconds. Purpose of the speed : to check results when fast-dropping die hits a blank piece of metal. Objective : development of stronger, new-type alloys for greater, faster aircraft.

. . . Another current research project creates arctic flying conditions 20,000 feet above the California desert. On an actual F-94 All Weather Jet Fighter, a spray bar shoots a fine, foggy mist on the nose and wing, building up layers of ice. Plane's de-icing equipment is thus tested in actual flight.

Past and future at Lockheed . . .

One of Lockheed's earlier transports, a Model 10 Electra, is approaching its 25,000th hour of flying time, in continuous service since 1937 for South Coast Airways, Pty., Ltd., of New South Wales (Australia) . . .

Now Lockheed Super Constellations, in service by year's end, will be the largest, fastest, rangiest commercial transports in service. So well have earlier Constellations proved themselves around the world that more than 100 Super Constellations were ordered before the first production model flew . . . The new Lockheed-developed thin wing for the advanced F-94C — so thin it looks almost fragile — is strong enough to support two fully-loaded Super Constellations (150 tons dead weight) — one at each wing tip. This new plane, America's continental defender because of its electronic superiority, contains enough installed electrical power to supply a small community.

Leadership demands constant achievement

Again this week!

Experienced Constellations will add another 3,057,600 miles to their Record of Dependability

THAT'S FLYING EXPERIENCE — over three million miles — *every* week! Internationally famous, Constellations carry *more* people over more oceans and continents than any other *modern* transport.

Designed for long distance, Lockheed Constellations today fly the world's longest routes . . . making them first choice for short trips too. Rely on the 15 great airlines that fly Constellations.

DEPENDABILITY IN ACTION—

In Korean combat Lockheed's F-80 *Shooting Star* proved to be a very rugged jet fighter . . . able to return to base in spite of unbelievable battle damage.

Fly Constellations Via:

International—Air France, Air India, AVIANCA, B.O.A.C., Israel Airlines, KLM, L.A.V., Pan American, Panair do Brasil, QANTAS, South African Airways, Trans World Airlines.

United States—Capital Airlines, Chicago & Southern Air Lines, Eastern Air Lines, TWA.

SCIENCE OF DEPENDABILITY—

Lockheed's new Electronics Building will house an advanced "Weather Laboratory", where every effect of weather can be studied first hand . . . increasing Lockheed dependability.

Lockheed

AIRCRAFT CORP., BURBANK, U.S.A.

Look to Lockheed for Leadership

STRIKING

Large bomb bay carries attack weapons

STRIKING DOWN

Double-fold wings are power-folded

FAIREY GANNET

(FAIREY 17)

ARMSTRONG SIDDELEY DOUBLE MAMBA

TWIN-ENGINED • ANTI-SUBMARINE • CARRIER-OPERATED

CHOSEN FOR SERVICE IN THE ROYAL NAVY

THE FAIREY AVIATION COMPANY LIMITED, HAYES, MIDDLESEX

FLIGHT
and
AIRCRAFT ENGINEER

First Aeronautical Weekly in the World

Founded 1909

No. 2239 Vol. LX. FRIDAY, 21 DECEMBER 1951

EDITOR
MAURICE A. SMITH, D.F.C.

ASSISTANT EDITOR
H. F. KING, M.B.E.

TECHNICAL EDITOR
C. B. BAILEY-WATSON, B.A.

ART EDITOR
JOHN YOXALL

Editorial, Advertising and Publishing Offices:

DORSET HOUSE,
STAMFORD STREET,
LONDON, S.E.1.

Telegrams, Flightpres, Sedist, London.
Telephone, Waterloo 3333 (60 lines).

Branch Offices:

COVENTRY
8-10, Corporation Street.
Telegrams, Autocar, Coventry.
Telephone, Coventry 5210.

BIRMINGHAM, 2
King Edward House,
New Street.
Telegrams, Autopress, Birmingham.
Telephone, Midland 7191 (7 lines).

MANCHESTER, 3
260, Deansgate.
Telegrams, Iliffe, Manchester.
Telephone, Blackfriars 4412 (3 lines).
Deansgate 3595 (2 lines).

GLASGOW, C.2
26b, Renfield Street.
Telegrams, Iliffe, Glasgow.
Telephone, Central 1265 (2 lines).

SUBSCRIPTION RATES
Home and Overseas: Twelve months £3 3s. 0d. U.S.A. and Canada, $10.00
BY AIR: To Canada and U.S.A., six months, $16.

IN THIS ISSUE:

B.E.A. Helicopter - - - 774
The Princess and the Sleeping Bo Ack - - 776
News from a Pioneer - - 778
Fuel Measurement - - 779
Atomic-powered Aircraft - - - - - 780
Brush-up for a Blimp - - 781
The "Flight" Folio - - 782
Jets and Met. - - - - 784
Airline Pilot Training - 786

On With The Show?

AN interesting impromptu discussion developed, during a luncheon last week, concerning the value or advisability of holding an S.B.A.C. Display at Farnborough every other year, as opposed to one every year. Before getting down to considered opinions, random thoughts were exchanged as to the number of new aircraft types to be expected during 1952, the cost of such an exhibition, military security and the productive time likely to be lost to the industry as a result of participation.

The Farnborough Show has become a world event in aviation and, in fact, has made such an impression that America is understood to be considering an aircraft industry show on similar lines. Moreover, in recent years, since the public days were added to the programme, it has become a national occasion as well. Thus, consideration must be given to the adverse reaction which might result if, in one year, the show were not staged. If popular feelings are aroused—and last year's public attendance figures in anything but encouraging weather showed this to have been the case—a definite responsibility is assumed. However, the argument was not concerned with abandoning the display altogether, but with the possibility of holding it in alternate years.

Another closely associated factor which has to be considered is the possibility that the R.A.F. might wish to stage a big display in the coming year. There were more "ayes" than "noes" when it was suggested during the discussion that to hold both an R.A.F. and an S.B.A.C. display in 1952 would be inadvisable and extravagant.

Certainly the aircraft production effort in the coming year will be concentrated mainly (though, we hope, not exclusively) upon military aircraft, and so there seems to be a good case for the suggested alternative of an R.A.F. or combined Services show. From the point of view of demonstrating individual aircraft types, the arrangement could be satisfactory, for R.A.F. Displays in the past have provided for a new-types park and flying demonstration, while in an industry year machines already in squadron service would continue to be shown to the public at Battle of Britain "at homes" and various local affairs as is already the practice. Again, the few new civil aircraft could make their bows on these same local occasions, and they would almost certainly be welcomed by the Royal Aero Club as part of its programme for a national air race meeting. For prospective buyers private demonstrations are usually arranged in any case.

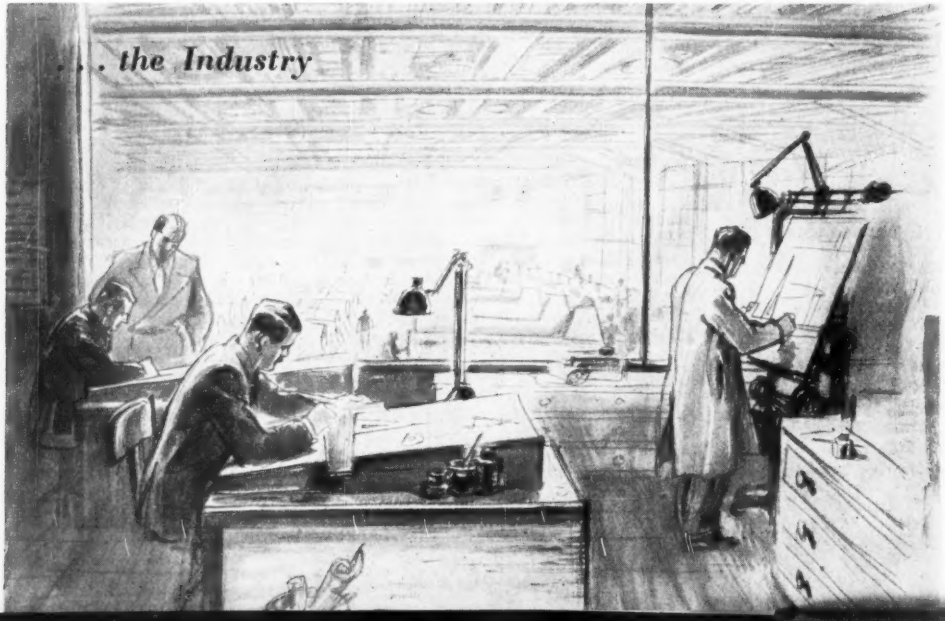
But what of the large and important ancillary industry to be found in the "static" at Farnborough? From the sales point of view, their exhibition is most important and, without doubt, needs to be held annually. One answer seems to be that this could be staged in an exhibition building in London at about the same time as, though not necessarily during, the flying display of the year.

The many guests from abroad might even find such an arrangement more convenient than the present scheme. The congestion, the problems associated with a non-permanent exhibition hall, catering, commuting daily between Farnborough and the London dinners and parties—all these matters would be simplified. We know, too, that there are few technicians who, during the few short days available, manage to study all the aircraft in the static park, witness the whole flying display, examine the stands in the static exhibition, and also meet their friends and business contacts. Certainly by the time one has deducted travelling time to and from Farnborough, and perhaps snatched some lunch, there seems to be little of the day left, so some form of dilution would be welcome. We do not propose at this stage to take a stand in this matter, but rather to assume the rôle of referee. We do feel however, that two major national air displays in 1952 would be unduly extravagant.

In the past each Farnborough show has acted as a spur to development in the British aircraft industry, and without its almost magical influence many prototypes which actually flew to the display in the September would still have been in the factory at Christmas. This almost magically effective spur is one that British aviation cannot afford to lose. But for the next week, perhaps, less serious affairs will be occupying the minds of our readers: so, before inviting them to turn to the seasonable features in this issue we wish them happy and prosperous months between now and next Farnborough-time.

CHRISTMAS GREETINGS

From the Editor and Staff to all our Readers: to . . .



. . . the Fighting Services

. . . the Clubs and Private Owners

FROM ALL QUARTERS

"Two Comets for R.C.A.F."

AS recently forecast, arrangements are under way for the procurement of two de Havilland Comets for the R.C.A.F. They will provide experience with the operation and maintenance of jet aircraft and afford a means of exercising Canada's air defence system against fast, high-flying raiders. The cost, with spares, is stated to be 3½ million dollars. Delivery is expected by the end of 1952.

A question in the Canadian House of Commons elicited the answer that the Comet had been selected because it was the only jet transport available, the Avro Canada Jetliner not yet being in production.

Swedish Delta

CONSTRUCTION of a delta-wing fighter, for night and all-weather operation, has been authorised by the Swedish Air Force, it is reported from Stockholm. Designated J.1200, the machine will be constructed in the Saab works at Linköping.

Cheaply to Paris

SINCE p.792 of this issue went to press, there have been further developments in the plans for tourist-class travel on European routes. Under a joint agreement, B.E.A. and Air France are to cut their fares by up to 40 per cent on the London-Paris route next October. B.E.A. low-fare schedules will be flown with 36-seat Vikings (27-seaters are at present used) and free meals in flight and free transport between airport and city terminals are to be eliminated. The companies are confident that their normal-fare services will remain fully booked. Tourist return fares will represent a saving of nearly 25 per cent over the first-class return fares by surface transport.

Wright Brothers Lecture in Washington

ON Monday last, December 17th, the fifteenth Wright Brothers Lecture was due to be delivered before members of the Institute of the Aeronautical Sciences in Washington by Dr. P. B. Walker, M.A., Ph.D., F.R.Ae.S., Head of the Structures Department at the R.A.E., Farnborough. Dr. Walker's paper described the experimental approach to fundamental research problems in aircraft structure. These problems were discussed in terms of recent work done in Great Britain and more especially at the R.A.E.

One aspect of this research was the testing of small models made of a material known in Great Britain as Xylonite and America under the trade-name of Celluloid. The paper also described research involved in the strength testing of actual aircraft as well as various design studies of new testing equipment for large aircraft and pressurized cabins.

Two Recent Appointments

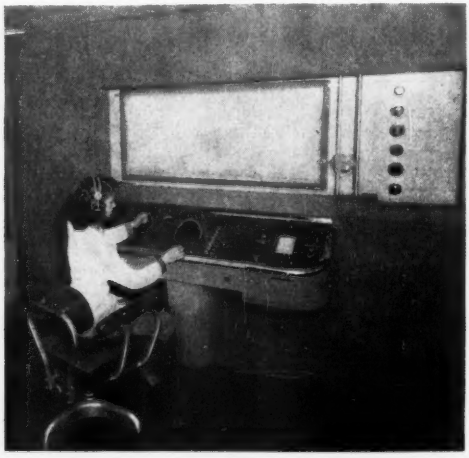
Mr. P. D. Irons, who has been elected to the board of Saunders-Roe, Ltd., after seven years as their secretary; he joined them in 1938 and is a director of two of their subsidiary companies, Saro Laminated Wood Products, Ltd., and Saunders-Roe (Anglesey) Ltd.

Mr. J. W. Carpenter, A.M.I.P.E., appointed to manage the new production unit for high-speed-aircraft components established at Croydon by W. A. Rollason, Ltd. He entered the industry 25 years ago with Short Bros., and managed their Swindon factory during the war.

A Flight-and-Fight Simulator

TESTS have just been completed with an F-86D flight simulator developed by the Engineering and Research Corporation at Riverdale, Maryland; named the Sabre Flightronic, it was designed and built under contract to the U.S.A.F. for North American Aviation, Inc. It is the first all-weather fighter simulator delivered to the Air Force; it is also the first to combine the simulation of the aircraft being flown and that of an approaching enemy machine. The cockpit duplicates in every detail that of the F-86D. Altogether, this electronic-mechanical simulator consists of over 100,000 parts, and a similar number of man-hours went to the construction of the prototype, which began simultaneously with the development of this mark of Sabre.

The simulator requires two instructors, one for flight performance and the other for radar operations. The latter also controls the "enemy aircraft." Unless the pupil promptly corrects a mistake, the train of events set in motion is said to conclude with something—nature unstated—that convinces him that he has suffered the appropriate penalty. Pictures appear below.



The cockpit of the F-89D flight simulator referred to above; on the right is the control-desk, with a decorative "instructor" of the kind characteristic of American publicity photographs. The simulators are to be delivered to F-86 squadrons as they are formed.

RAMJET RESEARCH: The Leduc 0.10 ramjet-powered research monoplane has completed a useful amount of development flying in the hands of M. Gonord, who is seen reclining in its tiny cabin. The present version of the 0.10 is air-launched from the Languedoc, upon which it is being loaded in the right-hand view, but it is understood that a catapult is being developed, which will render air-launching unnecessary.

Admiralty Scientific Appointments

THREE promotions to the rank of chief scientific officer in the R.N. Scientific Service have been announced. They are of Mr. J. Anderson, C.B.E., M.I.E.E., formerly Chief Scientist, H.M. Underwater Detection Establishment, Portland, and now Chief Scientist, Admiralty Signal and Radar Establishment, Haslemere; Col. A. V. Kerrison, formerly Superintendent of the Admiralty Gunnery Establishment, Teddington, and now Director of Aeronautical and Engineering Research, Admiralty; and Dr. E. C. S. Megaw, formerly Superintendent of Research, A.S.R.E. Haslemere, and now Director of Physical Research, Admiralty.

Mr. John Anderson, who began his career in the B.T.H. works during the 1914-18 war, has specialized in submarine detection, and in 1947 was awarded the American Medal of Freedom for his contributions to anti-submarine warfare in World War II. Col. Kerrison is a gunnery expert whose experiments on aided laying opened up a new line of development in A.A. fire-control, his design of a close-range predictor being adopted by both the British and U.S. Armies and used in many thousands. Dr. Megaw is a radio and radar specialist; during the war he led a team which made many significant contributions to magnetron development, while he was also responsible for G.E.C.'s part in the war-time studies of centimetric wave propagation under the ægis of Sir Edward Appleton's Ultra-Short Wave Panel at the Ministry of Supply.

Tools in the Making

IT will be recalled that we recently reviewed a colour film with commentary, *First and Best*, dealing with the manufacture and use of Firth Brown Tools. This film is available, in 16 mm size, for loan to technical schools, learned societies and similar organizations, and application should be made to Firth Brown Tools, Ltd., Speedicut Works, Carlisle Street, Sheffield 4.

RUSSIAN AIRFIELDS in GERMANY

OUR latest news of Russian activities in Germany concerns Peenemunde (war-time home of the V weapons, and concerning which there has been considerable speculation since hostilities ceased) and certain other airfields.

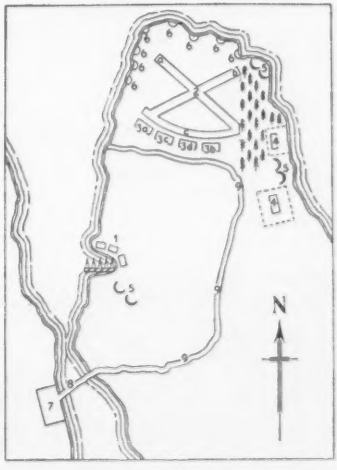
Of Peenemunde, it is reported that heavy fortifications along the northern coast are further strengthened by batteries of 9 cm anti-aircraft guns, spaced at 150 m. intervals. No light A.A. guns are reported there, but units of the Red Army, equipped with these weapons, are stationed in the country nearby. Behind the coastal fortifications is the airfield, which has two runways, crossing each other as shown in the sketch map, their southern ends being connected by a third. Close by this third runway are hangars, upon the most western of which is a radar installation and on the most eastern a 15 m radio aerial. Along the eastern side of the airfield are earthen blast-bays, 1.5 m high, wherein Mig-15 fighters are camouflaged with nets; along the eastern boundary is extensive forest land, at the northernmost point of which are launching ramps for guided missiles. These are confirmed as being "in service." Farther south are two establishments "for the development of guided missiles" and between these are two further launching ramps, though these are reported as not being in use. Russian and German technicians are said to be working in the establishments, the Germans being among those who went to Russia after the war.

In addition to German weapons, a new rocket is said to be under development and with it is associated "a light-blue flame and a launching-angle of less than 40 deg to the vertical." As a target for missiles of this sort (and also for the Mig fighters) the little island Der Ruden is used.

On the banks of the Peene River is a station of the See-Polizei, this being the new name of "the Navy of the East German Republic." The See-Polizei are equipped with small trawlers of some 210 tons, armed with machine-guns and "multiple guns" (presumably light flak). Nearby are two other launching ramps, both of which are reported to be in current use. The officers' quarters are also in this area.

At the time of the autumn excercises some 180 aircraft were stationed at Peenemunde, but the number is now reduced to 80.

The airfield at Briesen-Brand, near Königswusterhausen, south-east of Berlin is still under construction. Commanded by Col. Baranjuk, whose office is in Werder, near Potsdam, 450 workers of the Märkische Bau-Union are engaged on the completion of runways and dispersal points. The main runway is 2,500 m long and there is a second runway connecting the western and eastern

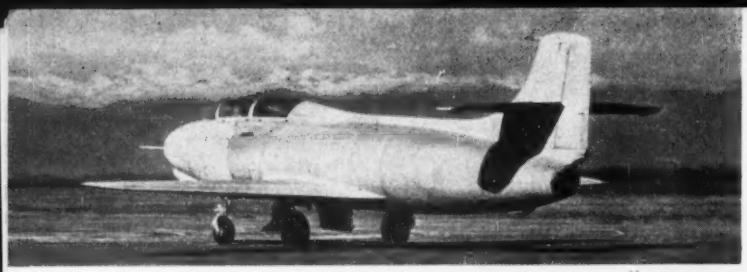


The layout of Peenemunde as described in the accompanying notes.

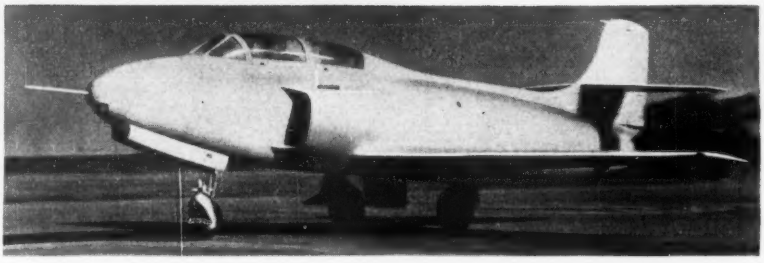
ends in the form of a flattened "U", with its base to the north. Three new buildings are under construction on the southern side of the runways, the cost of which, up to October this year, is reported to have been 12 million Eastern Marks.

On the perimeter of the northern U-shaped runway irregularly spaced circular dispersal-points have been built to the order of the Russians. They have a surface thickness of 30 cm (formerly 24 cm) and are 15 m in diameter. It was announced at the commencement of the work that these points should be capable of accommodating aircraft of the size of the Tu-4 (the Russian-built Boeing B-29 bomber).

At Rechlin-Lärz, for some weeks past, Russian jet aircraft of unspecified type (but not Migs) have been observed.



BRITISH POWER AND EQUIPMENT IN ITALY'S NEW TURBOJET TRAINER



First views of the completed—and finely constructed—Fiat G.80 tandem-seat jet trainer (de Havilland Goblin turbojet) which, as reported last week, has made its first flights near Foggia. Among British items of equipment are Martin-Baker ejector seats, Normalair pressurizing, Graviner fire extinguisher, and Siebe Gorman oxygen apparatus. (Cockpit picture below)

HERE AND THERE

More U.S.A.F. Bases

PERMISSION is being sought by Maj.-Gen. Leon Johnson, commanding the U.S. Third Air Force in Britain, to "rehabilitate certain World War II facilities." The Third Air Force is now maintaining 13 bases in England—including the five, in East Anglia, referred to by Mr. Churchill recently as atomic-bombing bases. It is expected that Boeing B-47 Stratojets will eventually be stationed in this country.

French 6,600lb-thrust Turbojet

BENCH-TESTS of a further-developed Atar 101C turbojet, made recently at Villaroche under the supervision of the French licensing authorities, showed a maximum thrust of 3,000 kg (6,614 lb) without the aid of water-injection or reheat. The existing version, now going into series production, has a take-off rating of 2,800 kg (6,173 lb). It is also reported from Villaroche that the Atar T.B. 1,000 turboprop was type-tested last month at an output of 1,520 e.s.h.p. A variant, the T.B. 1,000A, is being developed to give 2,000 e.s.h.p.

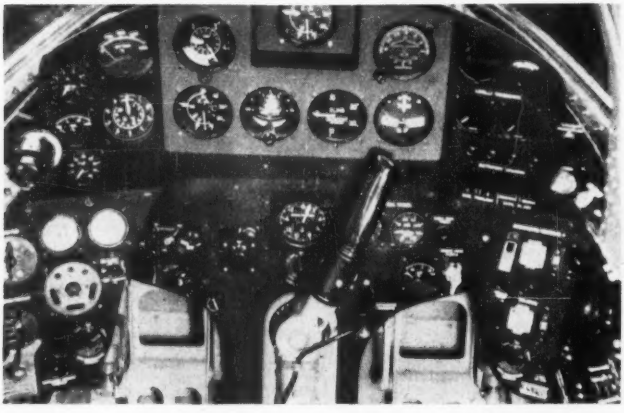
Works Within Works

LATEST addition to the Lockheed plant at Burbank, California, is a 96,000 sq ft "Special Projects Center," to consist initially of two large hangars housing machine-shop, fabrication and assembly bays, with an office block adjoining. The first aircraft to be constructed in the new section will be the XC-130 turboprop military cargo transport. Lockheed factory expansion during the past year has totalled nearly half a million square feet, at a cost of $3¾ million.

Water Wagon

JOHNSTON ISLAND, in mid-Pacific, depends on a salt-water-evaporation plant for its water supplies; and the plant depends on a compressor weighing six tons. Recently this compressor broke down. It was flown to California in a U.S.A.F. C-97 transport (together with eight tons of cargo and 25 passengers), repaired, and flown back in another C-97 in a matter of a few days, thus saving the island from a water famine.

Due to security restrictions, interior photographs of modern military jet aircraft are scarce, so there is special interest in this view of one of the Fiat G.80's cockpits. This aircraft, a wing and tailplane of which were shown in the Paris Salon, can be equipped for various forms of training.



Bomber-defence Missiles

IN the twice-yearly report of the U.S. Defence Department, prepared by General Marshall before his retirement, mention is made of missiles for increasing the defensive capabilities of strategic bombers.

A C-47 in Hungary—

UP to a week ago there had been no reply to American representations on behalf of the crew of the U.S.A.F. C-47 forced down by Russian fighters at the Soviet airfield of Papa, in Hungary, on November 19th. The machine carried a crew of four. *Pravda* accuses the United States of deliberate attempts to provoke incidents and to introduce "spies and Yugoslav diversionists" into Hungary and Rumania, and rules out any question of "navigation error or loss of direction."

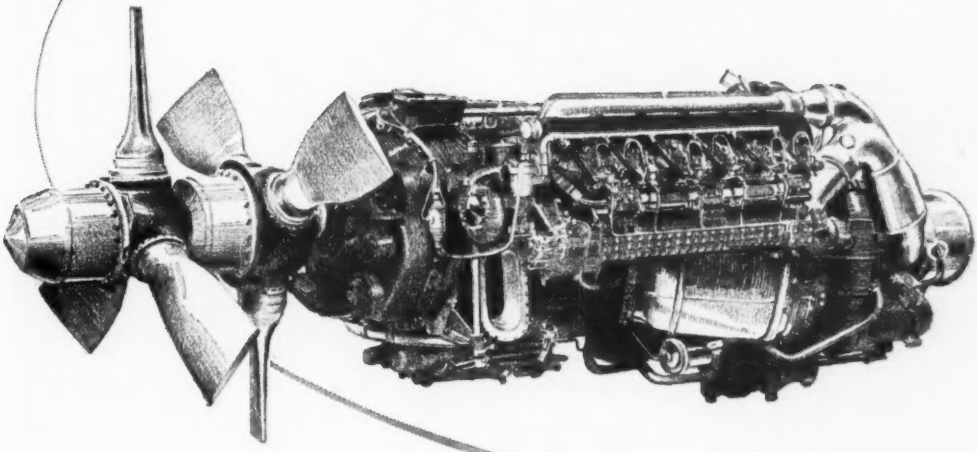
—and one Lost in France

ANOTHER C-47, reported missing on December 6th while on a flight from Tripoli to Bentwaters Airfield, Suffolk, was found two days later, wrecked at a height of some 3,000ft on the side of one of the peaks of the Ste. Baume Mountains in Provence. There were no survivors among the ten persons—including five senior officers—believed to have been on board. The wreck was first seen from the air, by one of 20-odd French and American aircraft which had been conducting a search. It was later reached by a climbing party who remained on guard after food and blankets had been parachuted to them.

U.S. Air Losses in Korea

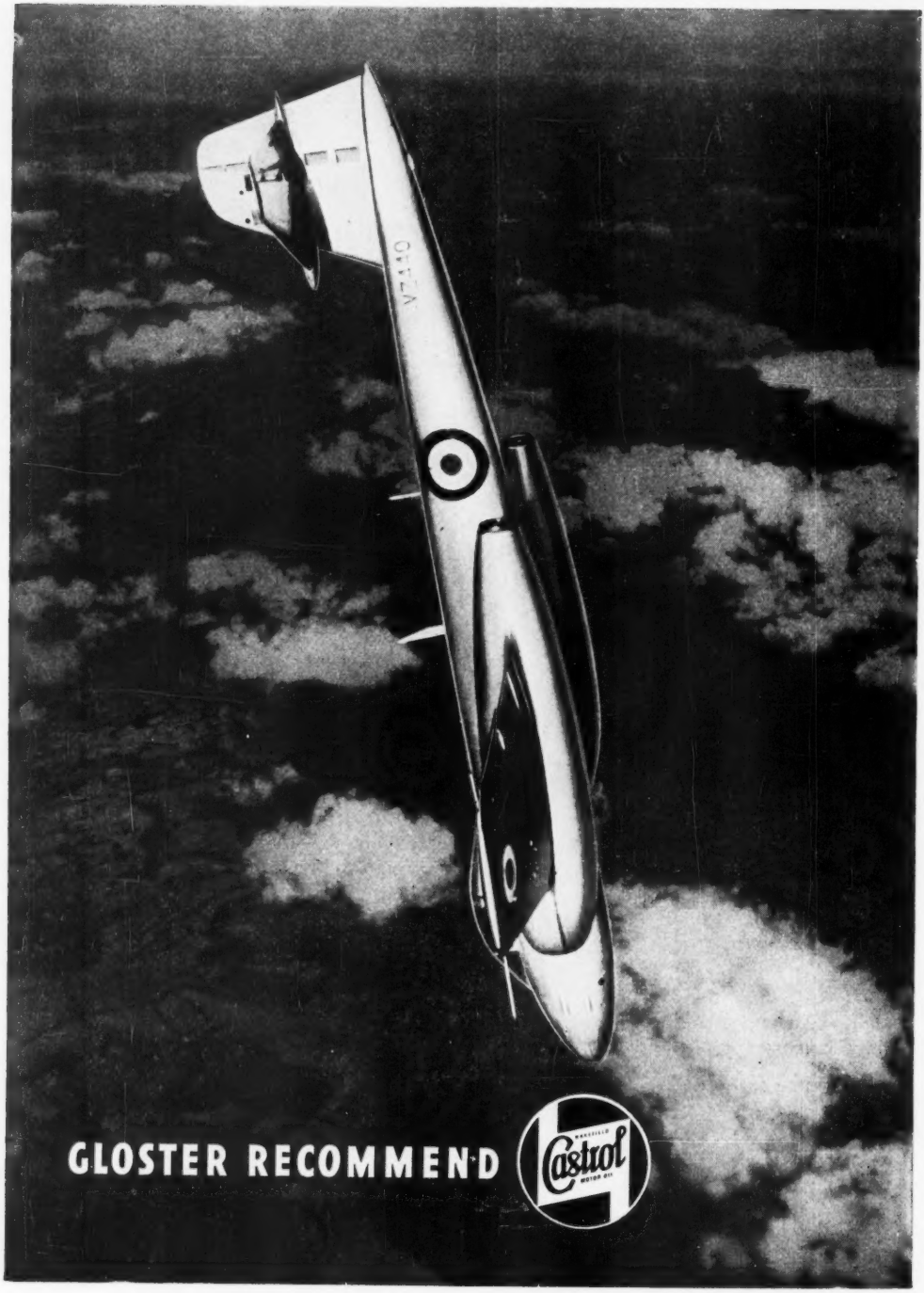
U.S. Air Force and Navy spokesmen in Washington last week said that, to date, over 900 American aircraft had been lost in Korea. This figure, which included some non-combat losses, compared with a claimed destruction of about 300 Communist machines in actual air or ground action. The officials said they did not view

NAPIER NOMAD



Nomad — the first composite gas turbine/piston engine, is Britain's newest contribution to aircraft propulsion. A 3,000 h.p. engine with a standard of operating economy hitherto unachieved, it follows classic Napier designs whose names are prominent in the story of British achievement in the air.

D · NAPIER AND SON LIMITED · LONDON · W · 3
C


GLOSTER RECOMMEND
Castrol

WELCOMED to Armstrong Whitworth Aircraft by Mr. H. M. Woodhams (managing director) is A. Cdre. Wynter-Morgan, the aircraft-armament expert who has recently joined them (see page 743, "Flight," December 14*th*).

DURABILITY : As foreshadowed in our November 23rd issue, the Hercules 634 engines of Airwork's Vikings have now gained A.R.B. approval for extension of their overhaul period to 1,200 hours. Here, seen examining stripped engine components after the 1,200-hour test-run, are (left to right) Messrs. Chayter and Carlisle (A.R.B.), Mr. G. Wright (Bristol), Mr. Mutch (B.E.A.), and Mr. Airdrie (Bristol). It is expected the B.E.A. will obtain a similar extension.

HERE AND THERE . . .

this ratio as disproportionate, as American aircraft had been in continuous action since the start of the war in June, 1950, while Communist air opposition had appeared in significant strength only in the last four months.

Missile Defence in Europe?

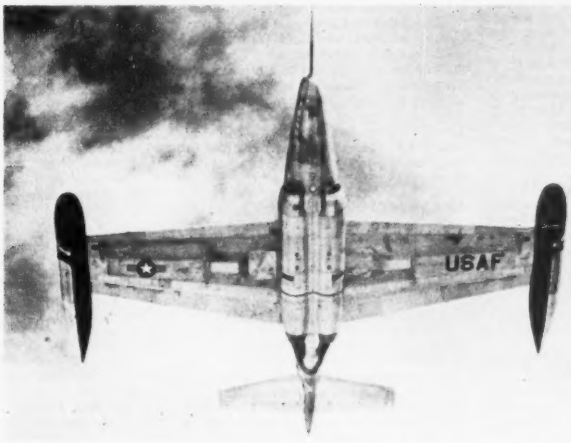
AFTER discussions at the Fontainebleau headquarters of Lt.-Gen. Norstad, C.-in-C. Allied Air Forces Central Europe, A. Cdre. L. G. S. Payne suggests in the *Daily Telegraph* that guided missiles might replace anti-aircraft guns for European defence. General Norstad himself did not wish to comment on this matter.

Captive Orbits

CONTROL-LINE models of the Hawker P.1067, Avro Delta and other modern aircraft will be flown tethered to a pylon, at the National Schoolboys and Senior Students Exhibition at the Horticultural Hall, London, from December 31st to January 12th. Made by members of the R.A.F. Model Aircraft Association, they will be on the R.A.F. stand; there will also be a full-scale mock-up of a Meteor cockpit, in which visitors can "fly" with the aid of a film projected on a screen in front of them.

On the Spot

OVER 50 teams are expected to take part in the 1952 all-England Aircraft Recognition Competition of the Aircraft Recognition Society, to be held at the Science Museum, South Kensington, on January 19th. The competition is open to teams of three, representing any recognized club, society or body interested in aircraft, and Service units including the R.O.C. and A.T.C. Closing date for entries is December 31st; entry forms are obtainable from the hon. secretary, at 15 Tavistock Street, London W.C.2. The test consists in identifying 35 views of aircraft shown on a screen. The trophy, a silver model Hurricane, will be presented by Mr. Peter Masefield, president of the Society. The umpire will be A. Cdre. C. H. Vasse, C.B.E., Commandant of the R.O.C.



BOXES OF FIREWORKS : The most interesting fact about this new view of the Northrop F-89D two-seat all-weather fighter is that the wing-tip tanks do not contain fuel, but batteries of rockets. Two Allison J.35 turbojets are mounted side by side in the belly of the fuselage. The prototype Scorpion made its first flight in August, 1948.

IN BRIEF

RECENTLY appointed to take charge of publicity for Dowty Equipment, Ltd., is Mr. Stuart C. Brander, formerly of the publicity department of the Gloster Aircraft Co., Ltd.

* * *

L. A. Rumbold and Co., Ltd., the aircraft-interior furnishing specialists, have shipped 600 Dunlopillo-upholstered seats to the K.L.M. maintenance works in Holland. Dunlopillo seating has recently been installed in a number of DC-4s.

* * *

Aluminium Alloy Forgings—A Note on Progress is the title of the latest technical brochure published by High Duty Alloys, Ltd., Slough, Bucks. The author is Dr. C. Wilson, Ph.D., A.R.S.M., production metallurgist to the company.

* * *

Mock football matches between a men's fancy-dress team and an all-girl team from the Strathendry factory of Thomas de la Rue and Co., Ltd., have raised the sum of approximately £100 for Leslie (Fifeshire) Old Folks Committee and the R.A.F. Benevolent Fund.

* * *

As we announced in our issue of November 9th, Blackburn and General Aircraft, Ltd., have acquired United Kingdom and Commonwealth sales rights for the very successful range of small gas turbines made by the French Turboméca Company. The newly formed Blackburn-Turboméca Division (43 Berkeley Square, London W.1 Grosvenor 5771) has now issued a particularly comprehensive data brochure on the range, prepared under the headings Air Compressors, Shaft Turbines, Jet Engines and Ducted Fans.

* * *

From Racal, Ltd., 41 Kingsway, London W.C.2, comes literature describing the activities of the firm, which was formed last year to provide specialized service in the communications (especially radio and radar) field. This service includes planning of facilities, selection and provision of equipment and spares, despatch of installation engineers to any part of the world, and training of communications staff. It is stated that, in addition to Commonwealth authorities, the governments of eleven countries have already made use of the facilities offered by the company.

B.E.A. HELICOPTER

Outline Specification, to be Circulated to the Industry, for a Large Rotorcraft

AS a result of experience gained during the past four years with the B.E.A. Experimental Helicopter Unit, together with engineering, economic and traffic studies made by the Corporation on potential helicopter developments, B.E.A. has now drawn up a specification—intended for circulation to the British aircraft industry through the Ministry of Supply—setting out the requirements for a large commercial helicopter. The main items of the specification are given in these two pages.

VARIOUS studies made in this country and in the U.S.A. have shown the need for a helicopter of large size—judged by present standards—in order to obtain an economic fare level. Past and recent civil air transport experience shows that, during the life of an aircraft type, the development of traffic and the operation of other factors are constantly pressing an aircraft capacity. This pressure is reflected in the steady increase, seen all over the world, in the payload capacity of transport aircraft for specific routes and route systems.

Hence, in the absence of precise knowledge of the demands for helicopter transport within the U.K. and to near European capitals, the B.E.A. policy is to specify the largest payload capacity—and, thus, aircraft size—generally agreed to be within the competence of existing design knowledge, and the development which reasonably can be expected during the next five or six years. This line of approach leads to the broad definition of an initial design payload and a "developed" payload. Thus the designed capacity should be not less than 30 seats over 100 naut. miles stage, whilst a larger capacity of 36 seats over the same stage is desirable. In the course of the life of the helicopter in service, it is expected that it will be capable of development to a capacity of 35-45 seats over a 200 naut. miles stage. The corresponding payload in terms of freight capacity are, in round figures, 7,000 lb initially for 100 n.m., developed to 10,000 lb for 200 n.m. during the operating life of the aircraft.

Broad Operational Requirements.—The aim is to provide a new means of transport giving a direct air service between city centres or other desired points, without the need for the large take-off and landing spaces required for fixed-wing aircraft. Stage distances and times will be short, particularly on internal services, and high regularity and punctuality are essential. The initial standards for these services will be a regularity of at least 95 per cent over the year, and such mechanical reliability that delays of departure resulting from engineering defects occur on less than two per cent of scheduled flights. These standards demand a high degree of reliability from the aircraft, and the ability to fly in all but the very worst weather. Compliance with appropriate air navigation orders and regulations and, in particular, operation under visual or instrument flight rules, by day or night, in all parts of the available air-space, including control zones and areas, is essential.

Low Maintenance Cost.—The helicopter must be of robust construction, and so designed that rapid development of long overhaul lives may be expected. The choice of power plant is of primary importance and, whilst this need not be restricted to fully proven types, credit will naturally be given to the employment of a power plant which the operator already has in use. A less direct but equally important result of engineering reliability and simple maintenance is a high potential utilization. A "sealed servicing" system of maintenance is a basic requirement.

Cruising Speed.—This should be as high as possible in order to increase the potential earning capacity. An important operational advantage of high cruising speed is improved punctuality in adverse winds. Equivalent headwinds of 30 kt or over can be expected in the U.K. on one to two per cent of flights at 2,000ft, taken over the year. An increase of cruising speed from the current 75 kt up to 125 kt would halve the journey time in a 30-kt headwind.

Safety.—A multi-engine design with adequate performance with one engine inoperative is essential. De-icing or anti-icing and handling qualities at all flight speeds, which do not impose excessive demands on the pilot in the worst weather conditions, are required. The helicopter must be of metal construction to meet current B.C.A.R.s, and particular attention must be paid to the design and manufacture of all parts subjected to fluctuating loads, even at the expense of payload.

Performance

Payload and Range.—The payload shall be made up of passengers and baggage according to the following table :—

Service	*Range of stage lengths n.m.*	*Average pass. weight lb*	*Average baggage weight/pass. lb*	*Total pass. unit lb*
Internal	20-160	155	25	180
Continental	120-240	160	40	200

The payload for the average internal stage of 100 n.m. shall be not less than 30 passengers, using the stated reserves and allowances. Accommodation shall be provided for the payload possible with a fuel load needed for the completion of a 20 n.m. stage.

The fuel load for any stage is to be calculated on the engine manufacturer's stated fuel consumption plus three per cent at the power output required at 2,000ft for the average cruising speed and for the following duration : (*a*), the duration for the stage distance in a ten-knot headwind, plus (*b*), ten-minute take-off and landing allowance for time spent in ascent and descent without covering distance, and for increased distance flown at terminals in conforming to traffic control requirements. In addition, the fuel required at the minimum power for level flight for (*c*), 60 min hold-off duration. Tankage shall be provided for a 200 n.m. stage in a 40-kt headwind with the reserves and allowances stated in (*b*) and (*c*) above.

Speed.—The design speed at which the level of vibration shall not exceed that laid down should be as high as possible, providing always that in choosing the design parameters to achieve a high design speed, the basic aircraft type costs/ton mile at the average cruising speed and at a given annual utilization do not significantly depart from the optimum. In any case the design speed shall not be less than 130 kt.

The average cruising speed to be used in the assessment of direct operating costs shall be not less than 120 kt or 90 per cent of the design speed under the following conditions : (*a*) power plants operating at maximum W.M. power, or 50 per cent M.E.T.O., whichever is the lesser, in the case of piston engines, or at 50 per cent maximum power output in the case of turbines; (*b*) the aircraft at 95 per cent of the maximum take-off weight; (*c*) cruising height, 2,000ft. The cruising speed at 5,000ft with the critical engine inoperative shall be not less than 100 kt at the maximum continuous power rating of the remaining engine(s).

Climb.—The vertical rate of climb at sea level and maximum power output shall be not less than 600ft/min, without ground effect, and at zero forward air speed. The hovering ceiling without ground effect and with maximum power output shall be at least 5,000ft. With the critical engine inoperative and the remaining engine(s) at maximum continuous power rating, the rate of climb at the best forward speed for climb shall be not less than 200ft/min at all altitudes up to 5,000ft.

Take-off and Landing.—The helicopter should be capable of operation from and into sites of limited dimensions closely surrounded by obstructions. The characteristics of such a site may be taken as follows : An area of ground 400ft in diameter with surrounding obstacles within a conical obstruction surface generated by a gradient of one in two and intersecting a circle 300ft in diameter concentric on the site. For any landing or take-off a strip 400ft long and 200ft wide is available to the aircraft, and this is so disposed that the larger dimension is not inclined at more than 30 deg to the direction of any wind greater than 3 kt in strength.

In the event of failure of the critical engine at any stage of take-off from the site, it shall be possible to return safely to the alighting area, or continue flight to land elsewhere. With all power units inoperative, the total landing distance over a 100ft screen shall not exceed 150 yards in still air.

The pilot's view shall be adequate for approach to the rotor station by night (when light patterns on the surface of the station must be clearly seen) at all angles of the approach path up to at least 50 deg above the horizontal.

Handling

Static longitudinal stability should be positive, e.g., with constant throttle and collective pitch settings, a rearward displacement of longitudinal control should be necessary to obtain and maintain speeds below the specified trim speed, and a forward displacement should be necessary to obtain and maintain speeds above the specified trim speed. This should apply at all loadings and in the following configurations :—

(i) Climb : Using maximum continuous power for speeds 20 per cent below to 20 per cent above the speed for best rate of climb.

(ii) Cruise: Using average cruising speed power for speeds 20 per cent below to 20 per cent above the average cruising speed, or to such a speed that vibration makes the test impracticable, whichever is the lesser.
(iii) Hovering: Using the power required for hovering in still air for speeds between the maximum for rearward flight and a forward speed of 20 kt.
(iv) Critical engine failed; and with remaining engine(s) at maximum continuous power rating for speeds between the maximum for level flight at this output, and zero.
(v) Autorotation: With zero power over the same speed range as (iv).

The Stick-free Manoeuvre Margin should be positive for all loadings and for speeds from the minimum power speed to the maximum speed of the aircraft. The pull-up characteristics in forward flight at all speeds from the minimum power speed to the maximum speed should be free from stick-fixed divergence.

Response to Control about all three axes should be effectively instantaneous, i.e., a time history of aircraft movement following control movement should show no lag in response over the whole speed range. The friction in controls should be low, and the force needed to overcome static friction should not exceed: lateral, 2 lb; longitudinal, 4 lb; directional, 6 lb. All controls should possess self-centring tendencies to the trimmed position.

Operational Features

Indiscriminate Loading of passengers for all numbers up to the seating capacity of the aircraft shall be possible. Fore and aft baggage compartments may be provided to facilitate trimming the load.

De-icing or Anti-icing equipment shall be applied to power plants, aerodynamic lifting and control surfaces, and cockpit glazing for forward and downward view, to make possible operation in the most severe icing conditions encountered in the U.K. up to heights of 7,000ft and for periods of up to two hours.

Cockpit Layout shall be for two pilots with full dual control, but it shall be possible for the aircraft to be operated from one seat, including starting and stopping. Pilots' safety harness (not lap straps) is to be provided.

Blind-flying Instruments will include gyro bank and pitch indicator, gyro direction indication, A.S.I., vertical speed indicator, and bank bubble. In addition each pilot's b.f. panel shall include rotor and engine tachometers and a sensitive altimeter. Provision shall also be made for an autopilot and a radio altimeter, whilst an approved device giving warning of engine failure or loss of power is also to be installed.

Ground Handling

The specification stipulates that simultaneous loading or unloading of passengers and baggage/freight shall be possible, and that doors shall be so positioned that this is still possible when a mixed load of passengers and freight is carried. Baggage/freight doors must be such that a truck can approach the opening without obstruction, and that a spare engine of the type used in the aircraft can be admitted. Rapid turn-rounds are essential, and it must be possible to unload and load passengers and baggage/freight, refuel and clean out the aircraft within ten minutes.

Passenger Accommodation

On the score of comfort it is stipulated that at least 1½ lb and preferably 2½ lb of fresh air/seat/min is required for passengers and crew at all heights. The supply of warm air shall be such as to maintain an internal temperature of 70 deg F with an ambient temperature of —10 deg C, and independent combustion heaters are not to be used.

Passenger accommodation is defined for four-abreast seating with a central gangway, the seats to be 42in wide per pair (24in above floor level) and with a minimum gangway width of 13in. A luxurious seat is not required, the comfort standard being that for a two-hour journey. A single pantry for serving light refreshments is to be so fitted that it is easily removable for replacement by additional seats. Interior arrangement is to be such that freight can be carried in the whole or part of the cabin without damage to furnishings. Accommodation is required for two stretcher patients, preferably without the need to remove seats, and outline proposals should be submitted for adaptation of the design for the carriage of cars.

Maintenance and Servicing

The maintenance and overhaul cycle of the aircraft should be predetermined by the operator in conjunction with the manufacturer before introduction of the aircraft into service, on the basis of representative rig tests on the power transmission system, including hubs and rotors, and on as many other components as is practicable and necessary, together with flight tests conducted by the manufacturer. Components which must be withdrawn for overhaul or examination shall have overhaul or examination lives stated. The engine overhaul life shall be at least 500 flying hours at the start of operations, with the prospect of increase during service life.

The accessibility of major components should be such that it is possible to withdraw them individually without withdrawing other major components. No controls or working parts requiring examination shall be put in positions where they cannot be examined, or from which they cannot readily be removed. Services and accessories of one type (e.g., electrics, hydraulics) shall be so grouped that engineers of different trades can simultaneously work on the aircraft without mutual interference.

The interval between successive maintenance operations shall not be less than 12 flying hours. The interval between successive maintenance operations involving removal of power transmission components for overhaul shall not be less than 100 flying hours, i.e., the overhaul lives of such components shall be multiples of 100 flying hours. The ease of removal and replacement of components shall be such that each maintenance operation of this type shall not involve the aircraft in a period of planned unserviceability in excess of 24 working hours. In particular, the time taken to change an engine shall not exceed three hours.

Power-transmission components shall be so designed that their assembly can be undertaken by engineers of average skill, and should not require adjustment by trial and error when refitted to the aircraft. Complete interchangeability of power-transmission components between different aircraft shall be possible. To minimise the holding of spares, the least possible number of different parts (including assemblies of components) shall be used. Standardized parts should be used wherever practicable.

The engines shall be capable of being started from within the cockpit and without external assistance. Engine accessories shall be driven through a separate gearbox. No vacuum or pneumatic systems shall be used: all systems shall be electric and/or hydraulic. Only one type of hydraulic fluid, only one type of lubricant, and only one type of grease shall be required.

Tools for the complete maintenance cycle are required. They should be of robust construction and the number of special tools needed should be small.

LOCKHEED HEATED SCREEN

A NEW electrically heated safety-glass, evolved by Lockheed Aircraft research workers during some five years of experiment, is now announced as having been perfected. It is being standardized on the enlarged windscreens of Super-Constellation transports.

To combat both exterior icing and interior misting, the new glass utilizes as a heating element a film of stannous oxide said to be only 0.000045in thick. Known as Nesa ("Non-Electrostatic Formula A"), this conductive film is sprayed on the back of a 3/16in pane of glass while the latter is almost red hot; this glass subsequently constitutes one of three laminations. Other sections are a ¼in sheet, next to the pilot, and a ¼in centre lamination of elastic vinyl, which, in the normal fashion, serves as a binding medium to prevent fragmentation of the glass in the event of the screen being struck by a bird.

A long series of laboratory tests simulating all conceivable flight conditions was necessary, because the heat generated from an input of 1 to 4 kW created difficulties. Final flight-testing was carried out on Constellations. One problem was to ensure that the Nesa element kept the back of the windscreen approximately 50 deg warmer than the front, which in turn had to be about 50 deg warmer than the outside air; if the rear glass were cooler, misting followed. At the same time, the aim was to keep the temperature of the vinyl interlayer at between 80 and 120 deg, the range at which it exhibits its best strength and elasticity. Automatic temperature control was achieved by incorporating in the vinyl a sensing element utilizing a semi-conductor composed of rare-earth oxides.

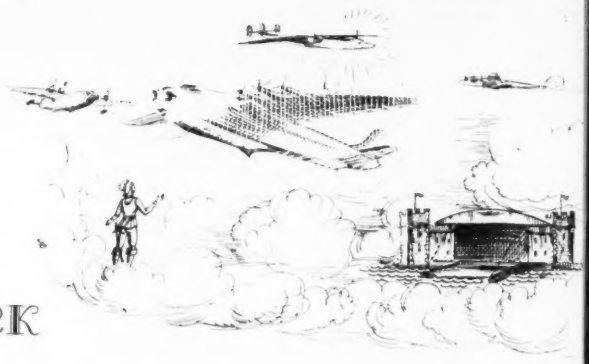
INAUGURAL VISIT

ON Thursday, December 6th, six B-36s of the U.S. Strategic Air Command returned to Carswell Air Force Base, near Fort Worth, Texas, after a non-stop training flight of 4,984 miles from Slimane, in French Morocco. A crew of 18 was on board each aircraft.

Slimane, one of the big new U.S. strategic airfields, was used for the first time—other than for local flights—when the B-36 formation landed there on their outward flight from Carswell on December 2nd.

This was the second transatlantic crossing by B-36s, the first having been made to this country on January 12th last.

A Christmas Fantasy
*by P. de Matante**...



THE PRINCESS AND THE SLEEPING BO ACK

ONCE upon a time there was a beautiful Princess who lived in a lovely white palace on the Island of Wight. Never since the time of Kitty Hawk had such beauty been known; and many were the brave men, and even Civil Servants, who made the long pilgrimage over land and water just to gaze upon her—and fall in love with her.

Their journeys were in vain, for the great gods of the White Hall had decreed that unless the Princess were claimed by the young Prince Bo Ack of England before the Tides of March, she would be condemned to spend her days as serving-wench to the royal bodyguard, in whatever Mess they might be at the time.

Unhappily, too, she lived in evil days, for there was a great darkness over the neighbouring Kingdom of England, varying from an incredible dimness at the Palace of Westminster to the usual thick fog over the far-off waste-land of Heath Row. And because of the dimness, legends of the beautiful Princess seemed never to reach the ears of young Prince Bo Ack, who longed for such a one as she to put his house in order.

Day after day he sat dejectedly in his Great West Palace, thinking of his treasury, which was so empty that it was used by his royal scientists as a space-flight research chamber. And, as always, he mourned the loss of his old nurse and maid-of-all-work, Cleo. She had been one of 28 tall sisters, born of a family of short brothers within the shadow of a castle beside a river in Kent; and because they had been born by the river, she and her sisters were fond of swimming, and when they floated on the water they looked like graceful silver swans. Cleo and her sisters had raised Bo Ack from a weakling to be the mightiest of all the Imperial heirs. That was long ago; but, now that she was gone, blame was laid upon her for the present hollow sound of Bo Ack's bank balance; for it was said that towards the end of her days she became feeble and inefficient, and squandered the housekeeping money, so that Bo Ack was able to maintain only twice as many palaces and six times as many servants as in the good old days. Bo Ack didn't really believe such stories because, having dabbled in the mystic cult of Wun Too Draw, he knew that figures, like Home Guards, can be made to form fours at will.

Little, however, did he realize that the author of his misfortunes was his trusted chancellor, Baron Larder of Theobalds Road, for, unlike Bo Ack, the Baron knew all about the Princess of Wight. But he dared not tell his master, for the Princess, like Cleo and her sisters, was tall and graceful—in fact, much taller and much more graceful—and fond of swimming, too; and Baron Larder had sworn to destroy all who loved the water, as his fortunes were invested in the Festival amusement park at London Fairport, and he feared that competition from the seaside might well cause him to lose money on the roundabouts as well as on the swings. So, day after day, month after month, he urged Bo Ack to wait no longer for the princess of his dreams, but to woo the fair Connie, beauty-queen of a great and far-off land flowing with mink and honeys. Finally, in despair, the young prince agreed to take the advice of his wicked chancellor, who at once despatched a speedbird to Connie, asking her to come quickly before Bo Ack changed his mind—as he often did.

* * *

Great was the joy in Connie's home when the glad tidings were received, for the great Imperial family of England had never before chosen a queen from beyond the seas. "Gee, PAA," she said to her father, "I feel like a million bucks."

"Yeah, Babe," replied her PAA, rubbing his hands with Glee†, "And that's just about what Baron Larder will have to shell out to get my little Connie away from her old dad."

* * *

Even the great gods seemed to smile on the approaching union, for Connie was borne swiftly to England on the wings of four mighty Cyclones. But when she got there, she was filled with despair, for all she could see was fog—mile after mile of it. Vainly she tried to find the waste-lands of Heath Row, near which lay Bo Ack's Great West Palace. But, in the strange tongue of the royal meteorologists, it was Q.B.I., or Quite Blatantly Impossible; and the more she saw of the fog, the more she longed to return home, where (according to the posters) the sun was always shining and every newspaper-boy grew up to be a millionaire. So she turned tail and fled.

When Baron Larder heard what had become of his carefully-laid scheme, he gnashed his gnashional-health teeth in rage, swore a savage oath, and tore to shreds Magna and several other Charter Agreements that had littered his desk for months. Then he pressed the switch on a magic box on his desk and shouted into it, "Baron calling secretary, are you receiving me?" And ignoring his faithful secretary's assurance that he was being received very loud but not at all clear, he bellowed: "Tell the United Notions Committee they must meet immediately to discuss this terrible disaster, before Connie's PAA finds out what has happened and sends his boys over to liquidate us."

As always, the United Notions Committee made no progress. Each member in turn stood up and made a long, dreary speech, with which the others disagreed violently; and after several hours of this, they all became so bored that they went to sleep—a deep, deep sleep which showed every sign of going on for a hundred years.

* * *

Bo Ack, too, became infected by their sleeping-sickness. Fortunately, however, he had a twin sister named BEAtrice, who was such a honey that everyone called her Bea. She lived in a modest home, quite near her brother's palace, yet sharing none of the dimness which seemed to be instilled in every crook and nanny there.

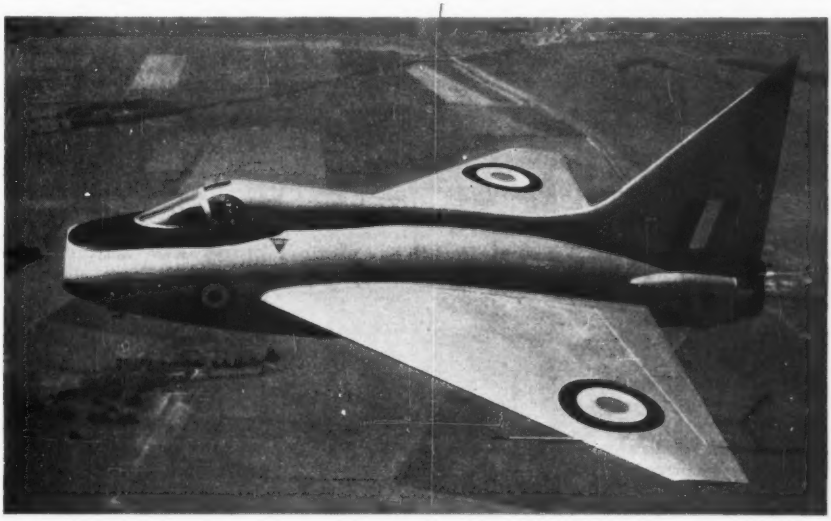
Although smaller than Bo Ack's, hers was a wise and great government, led by a much-respected Prime G. Minister (usually known as P.G.M.), who had gathered round him a glittering entourage of one Lord, some Viscounts and a

* Our well-educated readers will recognize the author—known to his family retainers as "His Nibs"—as an old school-friend.

† Glee keeps your hands handsome, and then some. From alchemists, in all popular sizes (*Advt.*

PROGRESS

Rolls-Royce produce turbo-jet,
propeller-turbine and piston aero engines to suit
all types of medium and high-powered aircraft



THE BOULTON PAUL P111 DELTA-WING RESEARCH AIRCRAFT
powered by the Rolls-Royce "Nene" turbo-jet engine

ROLLS-ROYCE
Aero
ENGINES

ROLLS-ROYCE LIMITED DERBY

INSIDE BEA No. 3 OF A SERIES

More and more Freight. BEA started scheduled freighter services in 1947. During the first year we carried 2,768,000 kilos of freight. This is in striking contrast to the record total of 10 million kilos carried during the twelve months ending July 31st, 1951. Indeed, to-day we work the largest air-freight system in Europe.

Structural Changes to the DC-3. BEA have made many interesting structural modifications to the Dakotas of the freighter fleet. For example, the freighter floors, formerly made of corrugated duralumin, now have a laminated wood structure (of equal or greater strength) which simplifies the problems of lashing and movement within the æroplane. This development enables us to use lashing nets and countersunk D rings in place of pip-rings. Another special feature is the superimposition of a bonded metal sheeting by the freighter door where wear is greatest.

Fleet Composition. At present all our freighter fleet are Dakotas, save one. This solitary exception is the Bristol Freighter, which has been bought especially to carry Elizabethan engines; so that an engine replacement can be flown out immediately it is required. We now are operating, experimentally, scheduled freight services with two Dart-powered Dakota freighters.

Goldfish and Isotypes. We handle every sort and kind of freight. Carrying 3 tons of goldfish from Italy—a bottle of whiskey between Northolt and London airport—special containers full of radio-active isotypes—bars of gold—it's all in the day's work. No special crews are recruited for freighter work; the air crew and ground crew are in general service.

Quick delivery. At 8 p.m. one evening we received an urgent telephone call from an air charter company in the Midlands. They wanted a 1½-ton Merlin engine to be delivered in Rome as quickly as possible. By 9.10 the next morning—ONLY THIRTEEN HOURS AFTER THE TELEPHONE CALL—the engine had been delivered to Rome airport. That is only one of the many striking examples of the speed with which we can deliver freight.

BEA

BRITISH EUROPEAN AIRWAYS

THE PRINCESS AND BO-ACK . . .

team of Ambassadors noted for their dignity and polish. Bea's was, in fact, a thoroughly democratic state, where even the common servants, who were descended from a race of ancient Vikings, could, by their loyal service, earn such noble titles as Sir Cloudesley Shovell and Sir Nigh Hevan.

Bea loved her brother, despite his profligacy; and when she heard of the disaster that had befallen him, her heart was filled with compassion.

"Dear P.G.M." she pleaded, "Can *you* suggest how we may yet save Bo Ack from this fate worse than death? Is there no person living who can wake him from his sleep and dispel the terrible fog which clouds his once-happy Kingdom?"

"Only one, my sweet Bea," replied her P.G.M., "The beautiful Princess of Wight, whose fortunes were once ordained by the mighty gods of the White Hall to be linked with those of Bo Ack."

"Then we must send an Ambassador to her, to ask her compassion for my brother. Please ask Sir Walter Raleigh to come and see me immediately."

Two days later the Ambassador arrived. He was always late, but he knew that both Bea and her P.G.M. would forgive him as soon as they set eyes on his immaculate white, red and silver uniform.

This they did gladly. Then, stopping only long enough to take a Decca at the map, the Ambassador made a bealine for the Island of Wight, bearing a personal message from his mistress to the fair Princess.

* * *

Meanwhile, Bo Ack in his deathly sleep perchanced to dream; and in his dream he saw again his old nurse, Cleo, who, with tear-dimmed eyes, told him how Baron Larder had foully murdered her, and of the plot to rob Bo Ack of the fair Princess whom the great gods had ordained as his salvation and joy.

Bo Ack groaned in agony as the fog lifted from his mind, for he knew that in but a few hours the Tides of March would turn the channel between his Kingdom and that of the Princess into a raging torrent, and that she would be lost to him for ever. But he could not free himself from the bonds of sleep induced by the terrible drug of his United Notions Committee. To whom could he turn for help? To Bea or not to Bea—that was the question.

Then the dream seemed to fade, leaving only a picture of the beautiful Princess before his eyes; and suddenly he realized that it was no longer a dream, but that she was really there, in his palace, with his well-loved sister Bea and her P.G.M.

"Dear Bea," he cried, "how foolish I have been these many years to listen to the wicked counsels of Baron Larder. Now all that is changed, for if she will stay with me I will link my fortunes for ever with the fair Princess of Wight. Furthermore, if you agree, we will combine our two kingdoms into one, under the noble leadership of your trusty P.G.M., and the Princess and I will share your modest home, for palaces are but dens of iniquity."

"Well spoken, dear Bo Ack," replied Bea. "For long we had thought to find room in our home for the great Bertie Brabazon of Bristol; but he is so fussy and there are so few places where he is really happy. Your Princess will be most welcome in his place."

And so it was that they all lived happily ever after.

THE AERONAUTICAL BOOKSHELF

"Rockets and Jets," by Marie Neurath. The Isotype Institute, Ltd., 51A, Rathbone Place, London, W.1. Illustrated; price 6s.

MOST adults have, at some time or other, been asked somewhat technical questions by children which they have not felt entirely qualified to answer. Succour for parents thus embarrassed seems guaranteed—when questions about rockets and jet aircraft occur—by the publication of this new Parrish Colour Book for children. Written by Marie Neurath, it is lavishly illustrated in bold colours, and will undoubtedly teach the child of inquiring mind a great deal as to how rockets and turbojet engines work; why a rocket can reach a greater altitude than a jet-engined aircraft; how the space-ship of the future may be driven, and much more besides. To a great extent, the answers to these problems are given by means of pictures. All unnecessary details which might obscure the meaning are rigidly excluded, the same object is always shown by the same simple, unmistakable outline, and colour is used functionally.

"Einfuhrung in die Technische Thermodynamik und in die Grundlagen der Chemischen Thermodynamik," by Dr.-Ing. Ernst Schmidt, published by Springer-Verlag, Berlin.

WHETHER or not the difficulty of sterling exchange is the reason for the comparative rarity of German books in this country we do not know. Whatever the explanation, the fact remains that few German textbooks are received over here, and this is a pity, for German technical ability has always been rightfully recognized as being of a high order. These thoughts are prompted by the arrival for review of the fourth edition of Dr.-Ing. Ernst Schmidt's classic textbook on thermodynamics. The title, incidentally, can be translated as "Introduction into Technical Thermodynamics and into the Basis of Chemical Thermodynamics."

The scope of the work has been broadened, and the text necessarily enlarged by comparison with the previous editions, principally by the consideration of gas-turbine requirements. The text is, of course, in German.

"Steels in Modern Industry," edited by W. E. Benbow. Published for "Iron and Steel" by Iliffe and Sons, Ltd., Dorset House, Stamford Street, London, S.E.1. Price 42s. (postage 11d.).

THIS book, a comprehensive survey of the subject, written by 29 specialist contributors, comprises 560 pages and some 260 illustrations. It was planned by a committee of eminent engineers and metallurgists headed by Dr. H. J. Gough, C. B., M.B.E., M.I.Mech.E., F.R.S., president of the Institution of Mechanical Engineers in 1949-1950, who contributes the foreword. Following an introductory section devoted as briefly as possible to the basic metallurgy of steel, there are 25 sections, each presenting concisely what engineers in particular fields need to know about properties of steels, their treatment, and their applications.

Aircraft and automobile steels are dealt with by R. Clink, A.M.I.C.E. and K. Metcalfe, B.Sc., A.R.I.C., A.I.M., while a section on gas-turbine materials is contributed by D. A. Oliver, M.Sc., F.I.M., F.Inst.P., G. T. Harris, M.A., F.Inst.P., and W. H. Bailey, A.Met., A.I.M. Also of particular interest to aircraft-designers and production engineers are chapters on surface protective treatments.

A particularly comprehensive index and bibliography add to the value of the work.

OTHER BOOKS RECEIVED

Brassey's Annual: The Armed Forces Year-Book, 1951. William Clowes and Sons, Ltd., Little New Street, London, E.C.4. Price 50s.

Radar and Electronic Navigation, by G. J. Sonnenberg. George Newnes, Ltd., Tower House, Southampton Street, Strand, London, W.C.2. Price 31s 6d.

Aeromodeller Annual, 1951. The Model Aeronautical Press, Ltd., Allen House, Newarke Street, Leicester. Price 10s.

Marshal Without Glory, by Ewan Butler and Gordon Young. Hodder and Stoughton, Ltd., Warwick Square, London, E.C.4. Price 15s.

Jane's All the World's Aircraft, 1951-52. Edited by Leonard Bridgman. Sampson Low, Marston and Co., Ltd., 25, Gilbert Street, Oxford Street, London, W.1. Price £4 4s.

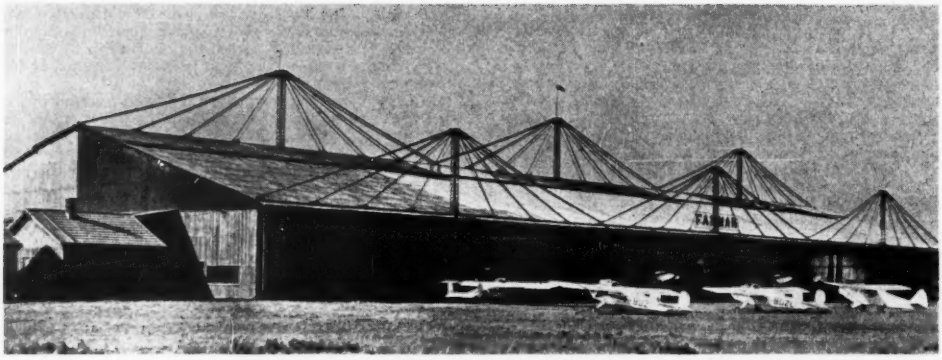
The Exploration of Space, by Arthur C. Clarke. Temple Press, Ltd., Bowling Green Lane, London, E.C.1. Price 12s. 6d.

Introduction to the Study of Aircraft Vibration and Flutter, by R. H. Scanlan and R. Rosenbaum. The Macmillan Co., St. Martin's Street, London, W.C.2. Price 56s.

Airplane Aerodynamics, by D. O. Dommasch, S. S. Sherby and T. F. Connolly. Sir Isaac Pitman and Sons, Ltd., Pitman House, Parker Street, Kingsway, London, W.C.2. Price 40s.

Rallies and Trials, by S. C. H. Davis of *The Autocar*. Iliffe and Sons, Ltd., Dorset House, Stamford Street, London, S.E.1. Price 15s.

Cash from Your Camera—How to Sell Snapshots to the Press, by Arthur Nettleton. Iliffe and Sons, Ltd. Price 7s 6d.



The big hangar at Toussus-le-Noble has its spans supported by a distinctive kingpost bracing system. Three of the four aircraft are N.C.853 trainers.

NEWS from a PIONEER

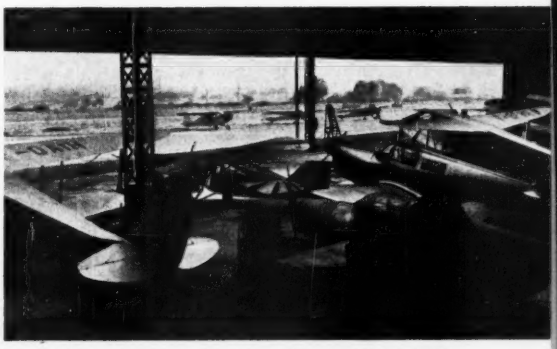
A Letter from Maurice Farman: Toussus-le-Noble—Constructed in 1908, Still Going Strong

IT may be recalled that in *Flight* for November 23rd Mr. W. E. P. Johnson, in an article on the introduction of instrument-flying into the R.A.F. 21 years ago, gave an entertaining account of his experiences at the Maurice Farman School at Toussus-le-Noble, near Versailles, whence he had been sent by the C.F.S. to find how it was done; for it was at this French school, soon after the first world war, that blind flying originated.

Following publication of the article, it was with considerable pleasure that we received a letter from that great pioneer M. Maurice Farman—brother of the famous Henry—containing some details and photographs of the airfield and buildings as they are today.

He recalls that the flying-ground was established by the Farman partnership in 1908, since when it has been continuously in use and constantly enlarged. In the inter-war years it was used regularly for the type-testing of both civil and military aircraft. After World War II—during which, we presume, it was occupied by unwelcome lodgers—it was used successively by the United States and French Air Forces. Then, when it had been linked with the adjoining airfield of Toussus-Paris, it was restored by the French Air Ministry to the ownership of Société Commerciale d'Aviation (Farman) in October, 1949.

The company subsequently carried out extensive rebuilding, which included the hangar—of unusual design—shown in the illustrations. The 65,000 sq ft of floor-space now available is devoted to a complete repair organization for all types of aircraft; it includes wood- and metal-working shops, heat-treatment furnace for light alloys, and three weighbridges of five to fifteen tons' capacity. The facilities are approved by the *Bureau Veritas* and other authorities.



On the inside, looking out: the aircraft in the foreground include Rapides, a Proctor and (in the centre) a high-wing monoplane privately built.

The flying school has re-started operations with N.C. 853 enclosed side-by-side two seaters, and charter operations are undertaken with D.H. Rapides.

M. Farman concludes his letter by saying, "I do not now take a very active part in our aeroplane business; it is run by my son, Marcel."

Incidentally, the Farman brothers are not, as many suppose, wholly French; their father was an English journalist resident in Paris, and they assumed French nationality.

PRIZES FOR H.P. APPRENTICES

A "JAMES HAMILTON Memorial Scholarship" is being created for the benefit of Handley Page apprentices and will enable one graduate a year to attend a two-year course in production engineering. Mr. James Hamilton was the firm's works director, whose death occurred on September 15th last.

The scholarship was announced by Sir Frederick Handley Page at the recent annual prize-giving to the firm's apprentices. He stressed the importance of the practical training which is given and referred to the company's new scheme which trains cost and works accountants.

Guests were A.V-M. N. S. Allinson, Director-General of Manning, Air Ministry, who presented the prizes, Dr. J. Richardson, Principal of Northampton Polytechnic, and Mr. E. Howells of the Headmasters' Employment Bureau. An audience of considerable size watched the presentations

A.V-M. Allinson likened the prize-giving to a passing-out parade, and said the R.A.F. heartily welcomed ex-apprentices. There was a great demand for officer material in the R.A.F. Technical Branch.

Dr. Richardson described the new laboratory facilities which were planned for Northampton Polytechnic, and also referred to the advanced post-graduate courses in specialist subjects now available.

Prizewinners were: D. Peckham (5th year); S. Lennox (4th year); G. Jones, P. Jaffray, E. Martin (3rd year); K. Noble (2nd year); R. Ayers (1st year).

FUEL MEASUREMENT

Precision Surveillance of Consumption : An Ingenious New Meter

FOR the pilot of any modern aircraft, be it the Brabazon or a fighter, the precise knowledge of the amount of fuel in the machine's tanks at any instant is vital—not so much in itself, perhaps, but acutely in relation to the flight time expended and anticipated, the flight conditions existing and expected, the engine settings, weight distribution and, in short, all the circumstances which permutations of these and their related factors can combine to produce.

George Kent, Ltd., of Luton, Beds, have tackled the problem by devising automatic fuel-flow meters in the form of a transmitter which, interposed in the fuel line, measures the fuel flow rate and accordingly sends electrical impulses to a receiver which counts the signals and displays the information—in any standard unit of measure required—on the pilot's or flight engineer's instrument panel.

The transmitter unit comprises a light-alloy cast body in the upper part of which is housed the contact head, this being physically isolated by a joint-plate dividing off the lower compartment, which accommodates the gear train and working chamber and embodies the inlet and outlet orifices. Depending on the type of transmitter, the shape and size varies, and the internal drive between gear train and contact head is conducted either by vertical shaft through a packed gland, or by means of a magnetic coupling.

Available in three versions, medium capacity/low pressure, high capacity/high pressure, and high capacity/low pressure, the respective designations of the transmitters are MA.4504, MA.4506 and MAL.4002. The first-mentioned type has a working capacity of 11 to 400 gal/hr (100-2,880 lb/hr) with a maximum pressure-loss of 3 lb/sq in at maximum flow, the normal working pressure being 30 lb/sq in. For the MA.4506 unit the working capacity is up to 1,250 gal (up to 10,000 lb) per hour, with a pressure-loss of 12 lb/sq in at maximum flow; the maximum working pressure is 1,100 lb/sq in. Similarly, the MAL.4002 has a working capacity of 60 to 1,000 gal (480-8,000 lb) per hour, a pressure loss of 3 lb/sq in at maximum flow, and a maximum working pressure of 30 lb/sq in.

Fuel enters from beneath the working chamber and, in passing through it, drives the rotating assembly, to emerge through a port in the top of the chamber and so flow to the outlet orifice. The working chamber is, effectively, a brass drum in the lower part of which is a hub embodying an annular race for a roller. The roller is carried by the diaphragm of what is called the piston, albeit its motion is semi-rotary rather than reciprocating. This piston is, in fact, rather like a cylinder divided at mid-height by a diaphragm (the axis being that of the roller) and radially slotted for a tongue running from the chamber wall to the hub. The motion of the piston resulting from fuel flow through the chamber is shown in the diagrams.

Coaxially with the roller, but above the piston diaphragm, is a pin which engages an arm off the end of the vertical drive shaft, rotation thus being given through gear trains and/or magnetic couplings to the switchgear of the contact head. This comprises a gear and cam mechanism together with a switch—in essence, a make-and-break system to transmit impulses to the receiver units.

Just as there are different capacity transmitters, according to duty, so are there different receivers, although all types of receiver can operate with all types of transmitter. George Kent, Ltd., themselves make a receiver presenting the information in terms of gallons gone, whilst Smiths Aircraft Instruments, Ltd., make exclusively for Kents two types of receiver, one indicating rate of fuel flow and the other giving the same information plus the totalizing of gallons gone. Kent's gallons-gone receiver can alternatively be calibrated to indicate pound (weight) of fuel used and, of course, all receivers can be supplied calibrated in Imperial, U.S. or metric units.

The indicator mechanism is housed in a large S.A.E. case modified and extended to house the driving motor and

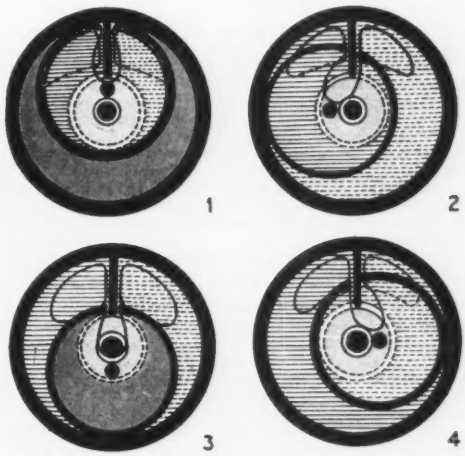


Diagram No. 1 *shows the inlet port open to the interior of the piston (solid lines). In-flowing fuel causes the piston to start a semi-rotary movement, sliding along the division tongue and displacing the neutral fuel (dark stipple) which, in turn, becomes exhaust fuel (broken lines) as shown in Diagram No.* 2. *At No.* 3 *is shown incoming fuel on the inlet side of the chamber with neutral fuel inside the piston and cut off from both ports, and at No.* 4 *is the end of the exhaust stroke, with the piston about to open the inlet port.*

electric components. A cylindrical can is fitted over the rear portion to screen the assembly, electrical connections being made through a three-pin Breeze plug. In the rate and totalizing indicator the rate portion of the instrument is a chronometric mechanism which operates by counting the number of impulses received from the contacting mechanism of the flow meter during a given time interval. The time interval is part of a time cycle governed by a clock-type balance wheel and escapement, which last is maintained by a 24-volt D.C. motor that runs continuously and drives the escapement through a spring drum and friction drive. The driving torque applied to the escapement is governed by the torque exerted by the friction drive, while the spring drum (which, during regular operation, remains wound) serves only to store sufficient energy to maintain the operation of the escapement for at least two cycles after being switched off, so enabling the pointer of the indicator to return to zero.

FORTHCOMING EVENTS

Dec.	21.	Institute of Navigation: "Meteorology and Navigation," by Lt. Cdr. P. G. Satow, D.S.C., R.N.
Jan.	11.	A. and A.E.E., Boscombe Down: Contractors' Dinner.
Jan.	18.	Helicopter Association: "A Review of Helicopter Patents," by L. H. Hayward.
Jan.	18.	Institute of Navigation: "Navigational Errors," by W/C. E. W. Anderson, O.B.E., D.F.C., A.F.C.
Jan.	19.	Aircraft Recognition Society: Hurricane Trophy Competition.
Jan. 19-20.		Vintage Aeroplane Club : Rally.
Jan-Feb.	28-1.	Institute of the Aeronautical Sciences: 20th Annual Meeting, New York.
Jan.	29.	Society of Instrument Technology: "Mechanical Consideration in the Design of Servo Systems," by Prof. A. Tustin.
Feb.	11.	Institute of Transport: Brancker Memorial Lecture, by Capt. E. D. Clarke, M.C.
Feb.	15.	Institute of Navigation: "Navigation Aids for Military Aircraft," by S/L. D. Bower.
Feb.	20.	British Institution of Radio Engineers: "Search Radar for Aircraft," by P. L. Stride.
Feb.	22.	Helicopter Association: "Helicopter Power Plants," by A. Graham Forsyth, B.Sc., F.R.Ae.S.
Feb.	23.	Society of Licensed Aircraft Engineers: Main Lecture: "Some of the Responsibilities and Problems of an Airworthiness Authority," by R. E. Hardingham, O.B.E., F.R.Ae.S., M.S.L.A.E.

ATOMIC-POWERED AIRCRAFT

Some of the Problems now being Tackled in America: Basic Research Completed

THE American Air Force and the Atomic Energy Commission recently issued a statement concerning atomic-powered aircraft. This announced that the basic research on an atomic engine for aircraft had been completed, proving the feasibility of the project, and determining its general design. But, continued the report, there were still some vital, complex problems which remained to be resolved before such a power plant could be made, installed and flown. At the General Electric Company's Lockland, Cincinnati, gas-turbine factory, efforts were being made to find the solutions, and contracts had been awarded to the company for the subsequent manufacture of the atomic engine.

Some details of the unit have been given by Dr. Miles C. Leverett, who has been working on the project since its early days. Fuel, in the form either of uranium-235 or plutonium-239, would be distributed throughout the reactor, and tubes or pipes would ensure the flow of coolant which captured the reactor's heat—its usable form of energy. The absorbing rods for controlling the reactor, continued Dr. Leverett, could be inserted or withdrawn; if, in their original position, the rods were absorbing that number of neutrons which made the reactor most critical, i.e. with the power neither rising nor falling, then withdrawal would create a slight excess of neutrons in the reactor, and the power would start to increase. Deeper insertion of the rods would decrease power, since more neutrons would then be absorbed and, as a result, the chain reaction would gradually die.

Exact control of the reactor action was vital, first because there was a remote possibility of the unit becoming a low-grade atomic bomb, but, more important, because it might build up such heat that it could melt or disintegrate. Another problem was the best way of using the reactor heat; one method under consideration was the adoption of turbine-driven propellers actuated by steam generated in the reactor. A second suggestion was that the reactor should directly or indirectly take the place of the combustion chamber of a conventional turbojet engine. Variation of one of these basic ideas would probably be used for heat-utilization in the final nuclear engine.

Combating Radiation

Shielding the aircraft's crew from the gamma and beta rays given off by the reactor was a considerable problem. The requirements, said Dr. Leverett, were dictated by the two basic radiations which it was desired to stop. The neutrons were slowed down most effectively by light atoms, and for this reason a satisfactory shield would contain hydrogen atoms. Gamma rays, on the other hand, were degraded in energy and were stopped by heavy elements, such as lead. It was clear that the most suitable combination would be to have both light and heavy elements arranged in the most strategic fashion. The solution to this problem was very complicated.

It was further stated that another major headache was radiation damage to substances other than the human anatomy. Constant exposure to radiation caused some of these substances (which might be used as coolant for the engine) to lose their ability to conduct heat, and some just decomposed. Even outside the area of the most intense radiation, ordinary oil or grease would become like tar, or possibly solidify. Electrical insulation also broke down and disintegrated after long exposure to radiation.

Concerning the use of fuel, Dr. Leverett said that the chain reaction would continue in the reactor only so long as there was present a certain minimum quantity of fissionable material known as the critical mass. As soon as the reaction had consumed so much fissionable material that the mass dropped very slightly below the critical mass, the chain reaction died and could not be started again with adding more fissionable material. This made it necessary to remove the remaining fuel from the reactor, purify it and prepare it for re-use.

With reference to actual fuel weight, it was stated that one pound of uranium-235 will, on undergoing fission, liberate heat equivalent to the energy liberated by burning 1,700,000 pounds of petrol. Thus, fuel economy was of no concern to the pilot of an atomic-powered aircraft. It had frequently been explained that such a machine could fly round the world non-stop for about as long as the crew could withstand the strain of the flight. For a flight round the world at the Equator, and under cover of darkness, the aircraft would require a minimum top speed of 1,000 m.p.h., whilst, at the latitude of the United States, such a mission would require a speed of about 750 m.p.h.

Structural problems of an airframe for an atomic power plant were also reviewed by Dr. Leverett. It was probable that the aircraft would have swept-back wings, and be of a size between those of the Boeing B-50 and B-36. It was estimated that the necessary shielding apparatus for the crew would weigh between 50 and 100 tons, but this would take the place of the fuel load weight on a conventional machine, at least as far as size and strength in design were concerned, since the atomic fuel would weigh only a few pounds at most.

Weight Distribution

The existence of a large concentrated weight, such as the shield and the reactor, and its accommodation, made necessary considerable structural re-design of the airframe. In conventional aircraft, the weight was usually distributed over the wing and throughout the fuselage; concentrating the weight in the fuselage greatly increased wing bending moments. Although the aircraft would require heavy forgings inside the wing and fuselage structure, the outward appearance of the machine would not necessarily be affected. It had been suggested that the shield itself could be used to give strength to the airframe; this would appear to be a potential solution offering so many advantages as to make it virtually certain to be adopted.

The very fact that only a small amount of the atomic fuel was consumed in flight meant that the gross landing weight of a nuclear aircraft would be approximately the same as the take-off weight. This gave rise to a new set of possibly serious problems. Firstly, the landing gear had to be strong enough to take this higher landing weight. Secondly, the landing speed was increased, and a possible change in landing attitude might necessitate further modifications in the landing gear, or in the tail clearance-angle requirements. Recent extensive research on high-speed flying-boat hulls carried out by Convair, the company making the first atomic aircraft's airframe, might offer a solution to this problem, by the possible conversion of the design from a land-based to a water-based type.

TURBINE FUELS

BECAUSE the steadily increasing demand for aviation kerosine is likely to lead to a world shortage, the use in the near future of low-grade petrol in many jet aircraft is foreseen. No technical difficulties are likely to arise, though slight reduction in performance is to be expected.

In America, where petrol is frequently used in place of kerosine as jet fuel, an improved blend, bearing the designation JP-4, is shortly to be introduced by the Air Force. It will help to reduce the risk of boiling at high altitude from which the current higher-vapour-pressure fuel is said to suffer.

The main disadvantage of any such change lies in increased fire-risk, though recent news reports do suggest that crash-fires, at any rate, are almost as likely with kerosine as with petrol. In many instances, no doubt, ignition of lubricating oil—always a serious factor in initiating crash-fires—has been responsible.

In Britain's first operational delta wing aircraft ★

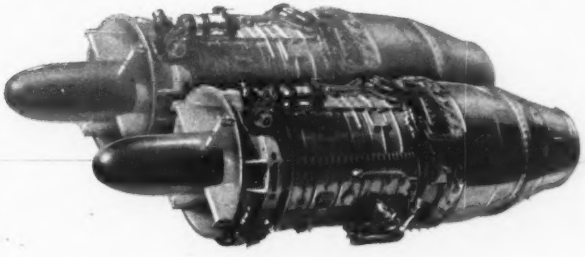
★ *the Gloster* **GA5** *is powered by*

TWO

ARMSTRONG SIDDELEY

SAPPHIRE **TURBOJETS**

each giving over 7,200 lb thrust



ARMSTRONG SIDDELEY MOTORS LIMITED

Coventry

Members of the Hawker Siddeley Group

AMBASSADOR

HERON

DOVE

DROVER

BEAVER

COMET

— the new world airliner

The de Havilland conception of a jet airliner for the trunk routes of the world is now attaining universal recognition, outmoding other forms of travel.

THOUGH the airship as a weapon of war has enthusiastic advocates in this country there has been little sign of any official interest. The United States, on the other hand, is convinced of its utility in an anti-submarine capacity, and the Goodyear Aircraft Corporation at Akron (where puns about anachronisms are not encouraged) continues a steady supply of non-rigids to the U.S. Navy. The striking pictures on this page were secured during a major overhaul of a Class G advanced training craft at the U.S.N. station at Lakehurst, New Jersey.

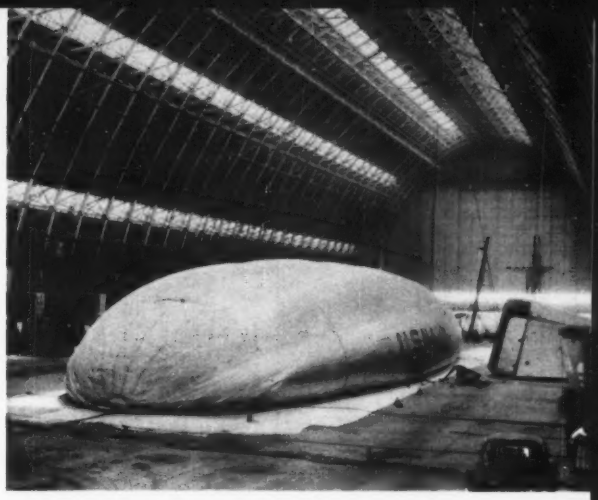
(1) *Envelope partly inflated with air to allow personnel to work inside; surfaces and car on the right.*

(2) *Spotlighted interior : hanging from the "ceiling" are the catenary curtains from which the internal rigging wires run.*

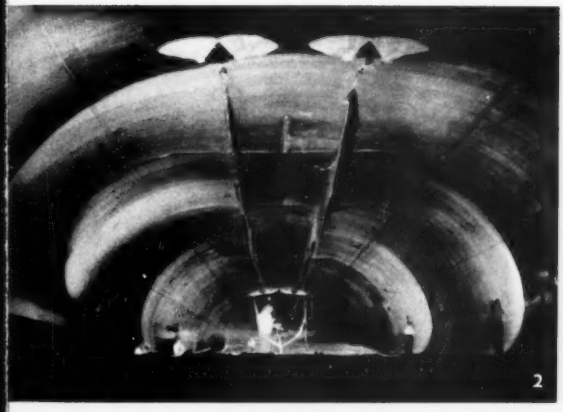
(3) *Close-up of the car, showing single-wheel caster undercarriage and, on outriggers, two 220 h.p. engines.*

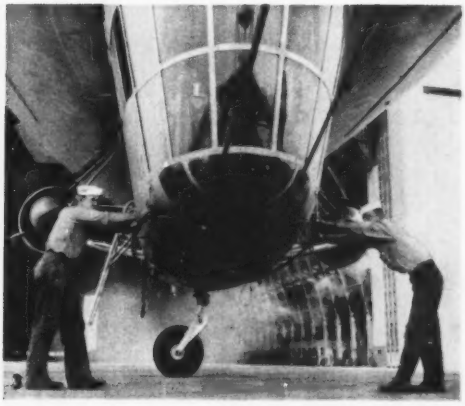
(4) *Inflated with helium and passed for flight, the ship emerges.*

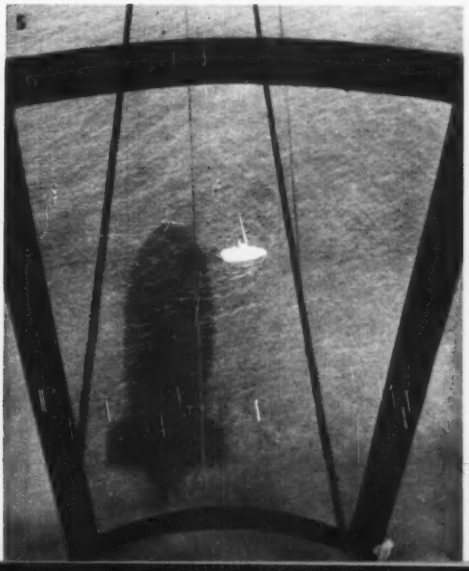
(5) *Shadowing—literally : the view downwards from the coxswain's station. The ability to hover is a valuable attribute.*



BRUSH-UP FOR A BLIMP



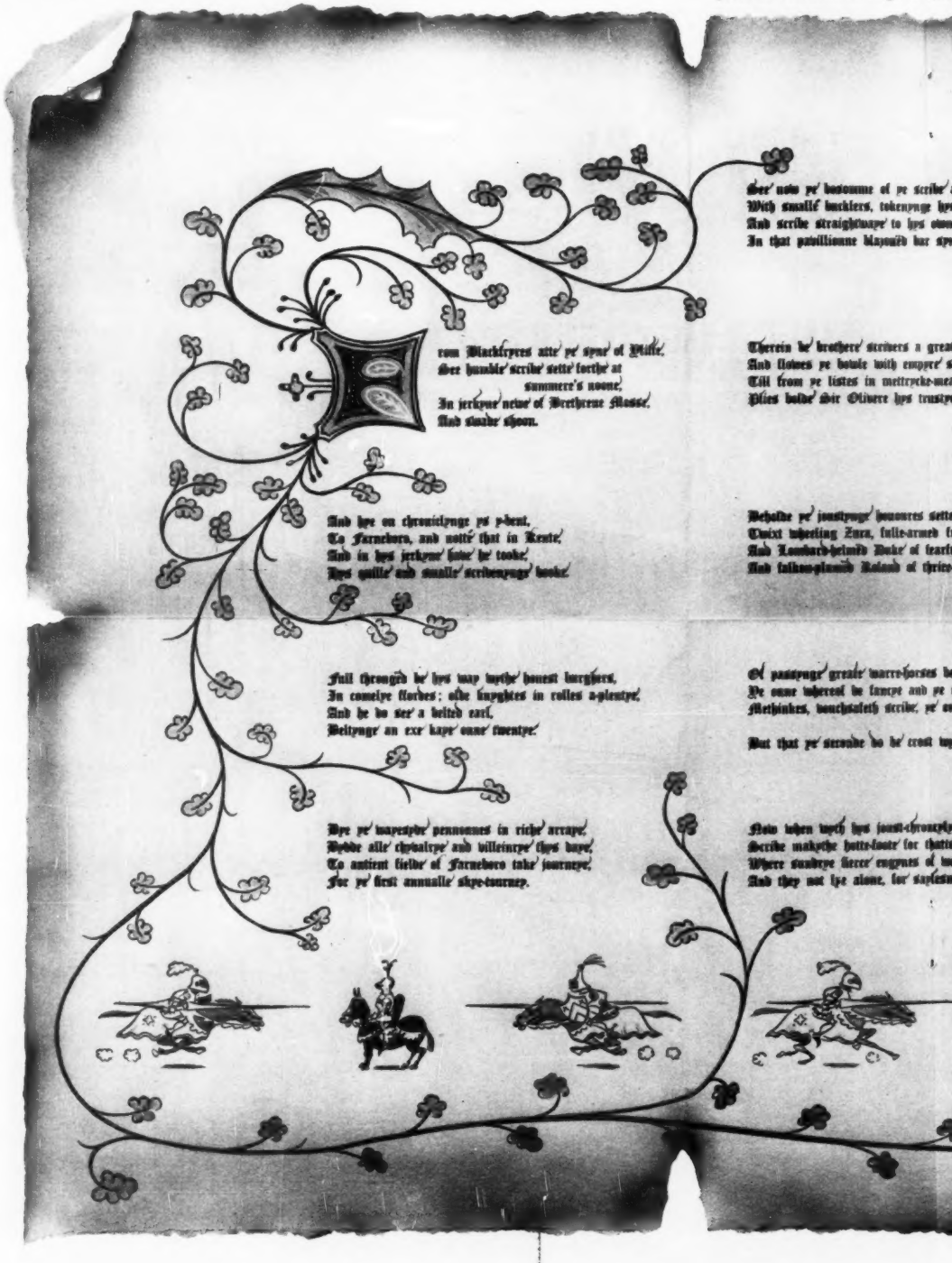




THE "FLIGHT" FOLIO—

A Newly Discovered Attestation to Antiquity

WHILE seeking office-room for
in appreciation of our Farnbo
upon this curious document, whi
the early—though by no means
journal. Notwithstanding the Chie


Here now ye bostomme of ye scribe
With smalle bucklers, tokenynge hys
And scribe straightwaye to hys owne
In that pavillionne blaunch bar sys
Therein be brothere' strivers a grea
And flowes ye bowle with empyre' s
Till from ye listes in mettrycke-mea
Plies bolde Sir Oliverre hys trusty
Behalde ye jousteynge honoures sette
Twixt wheeling Zara, fulle-armed
And Lombard-helmed Duke of Ivarl
And falkon-plumed Roland of thrice
Of passeynge greate warre-horses be
Ye ooune whereof be fameye and ye
Methinkes, bouchsafeth scribe, ye o
But that ye scrovde do be croste wy
Now when wyth hys joust-chronicle
Scribe makeythe butte-boote for that
Where sundrye fierce enginnes of w
And they not lye alone, for sayleste
Full throughe be hys way wythe honest burghers,
In comelye flordes; athe knyghtes in rolles a-plentye,
And he do see a belted earl,
Beitynge an exe kaye ooune twentye.
Hye ye wapenyde pennonnes in riche arraye,
Bydde alle chyvalrye and villeinrye clyps baye,
To antient fielde of Farneboro take journeye,
For ye first annualle skye-tourney.

for filing the mass of letters
rnborough reports we chanced
which appears to date from
ans the earliest—days of our
Chief Sub-Editor's invocations

of Fowler and the editorial style-sheet we reproduce it in facsimile. The illuminations are by a contemporary hand, and are 'apparently intended to depict the functional principles and tactical application of the ejector saddle, reference to which will be found in the text.

ribe arrayed,
hys traybe,
oune nedes bo myngelder,
r spynstere.

greate hepe,
re sack fulle hepe,
e-measured tones,
ustye mycrofones.

sette in balance,
d from Moreton Valeace,
earfulle speede,
prive-cornered steed.

s be there twayne,
ye othere playne,
oune be syred by
stallionne,
wythe galleonne.

eyknyge be be bonne,
atte greate pabillionne,
warre bo lye,
esmenne bo be spye.

Mont fearfulle of ye engynes to be habde,
Be wrought atte Actonne Greene, yclept nomadde,
From monstrous throates it gyveth flame and fyre,
Whereto ates bo belch at foe, wythe hyppe monte hyer.

Myne panoplie of warre a wondrous saddelle be,
Ye seat whereon be gyvenne a steadie artilleric,
And thys be fashioned for ye hard-pressed knyghte,
To make hys exitte upwarde oute of fyghte.

Suche preste there be whenne concourse homewarde wende,
That none bo wotte theye wendethe rounde ye bende,
And naughtye scribe bo simple whenne belted earl,
Outstrippid be hys pladdynge steinne and charle

Over nonne ye scribe, whilomme to take rebuke,
Bye ye theyre-nobile chapremanne of ye boarde,
Who chargeth hym: lancelles be notte reckyd ounce,
For contract hathe noe maydo withe Williame Caxtonne.

JETS AND MET.

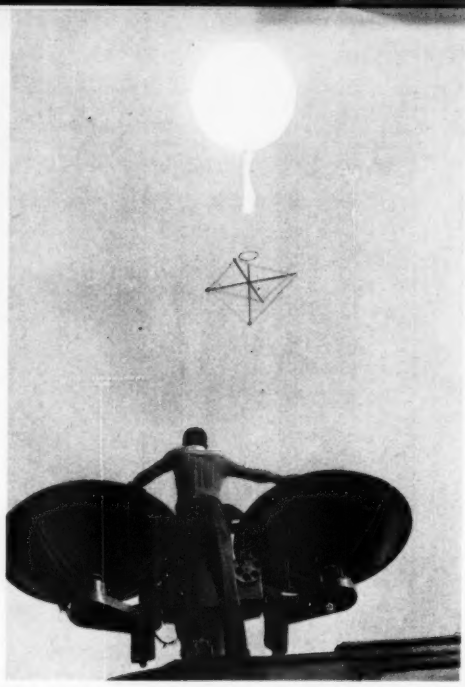
—in East Africa: Forecasting for Gas-turbine-aircraft Operations in the Tropics

By D. A. DAVIES, M.Sc., F.Inst.P.

FOLLOWING a visit to Tropical Africa, the Editor has dealt, in two preceding issues, with various aspects of civil aviation there; further articles are to follow. On the specialized subject of meteorology in the area, with particular reference to future operations by jet aircraft, he has invited the Director of the East African Meteorological Department to make the contribution which appears here. Mr. Davies will, we trust, forgive the contraction, in our title, of the space-consuming word "meteorology."

THE East African Meteorological Department, in common with most other meteorological services in various parts of the world, has for some time been giving consideration to the new problems which the introduction of jet aircraft on civil air routes will present.

While these problems are basically the same all over the globe, the techniques which need to be developed and the facilities which will be provided to solve these problems will vary from country to country. The techniques will vary because of the differing meteorological conditions in different areas; and the facilities will vary because overriding practical considerations—such as those of staff, telecommunications and, of course, financial resources—must be taken into account.



(Left) A B.O.A.C. crew being briefed in the meteorological office at Eastleigh Airport, Nairobi. (Above) An African assistant setting the aerials of the radar wind-finding equipment towards a balloon-borne radar target which has just been released. A combined radio-sonde/radar-wind ascent is made daily from Nairobi.

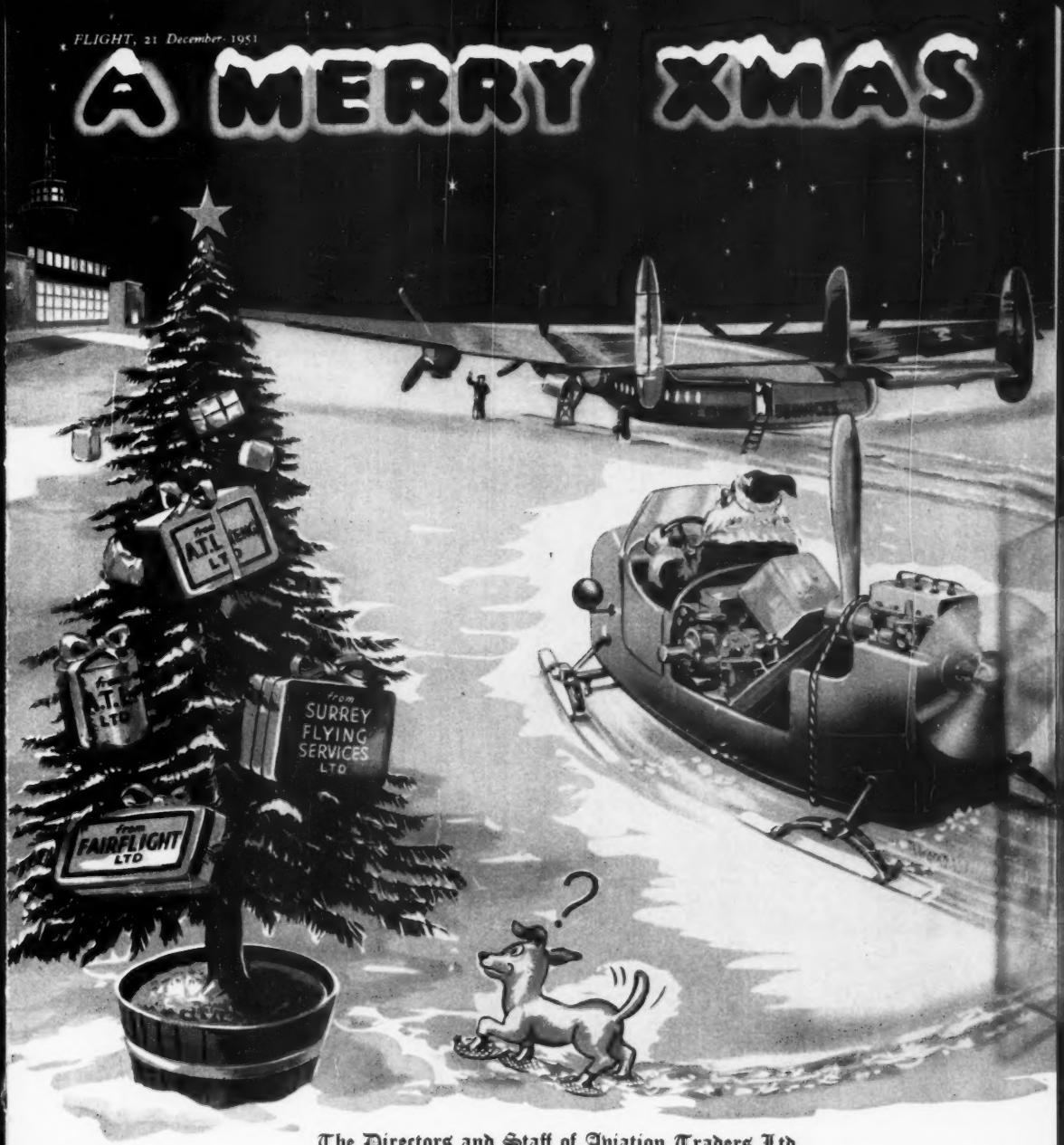
The first approach to the solution of almost any new problem of organization in aviation meteorology is to consider whether the existing system can be satisfactorily adjusted and whether the current forecasting techniques can be satisfactorily extended. In East Africa—and, no doubt, in other countries, too—the existing organization will, with certain adjustments, be able to meet the new requirements. The extension of forecasting techniques to meet these requirements is, however, much more difficult; completely new techniques have had to be developed for use in East Africa and neighbouring tropical territories. The recent announcement by B.O.A.C. of their intention to operate Comets through East Africa in 1952 makes the provision of an adequate meteorological service a matter of urgent practical importance.

Four main aspects of jet operations have a bearing on the meteorological service which such operations require. They are —

(*a*) The high altitudes at which jet aircraft operate.
(*b*) The high cruising speed.
(*c*) The reduced endurance at low levels.
(*d*) Take-off conditions.

Forecasting for High-altitude Flights.—The usual operational height of jet aircraft may be assumed to be of the order of 35,000 to 40,000ft. This is, of course, far above the normal operational height of conventional types and the meteorologist must, therefore, develop new techniques or extend existing ones. Development of radio-sonde and radar wind-measuring equipment has provided a valuable means of obtaining upper-air information to heights far above these at which even jet aircraft operate. Over some areas—such as Europe and North America—a network of radio-sonde and radar-wind stations has been established, and from the information so received techniques of upper-air analysis have been developed. Whether these techniques can be extended to cover the heights at which jet aircraft will operate is for others to decide, but it seems likely that it will be possible to do so. In Africa, such stations—particu-

An African meteorological assistant plots a synoptic chart at Eastleigh.

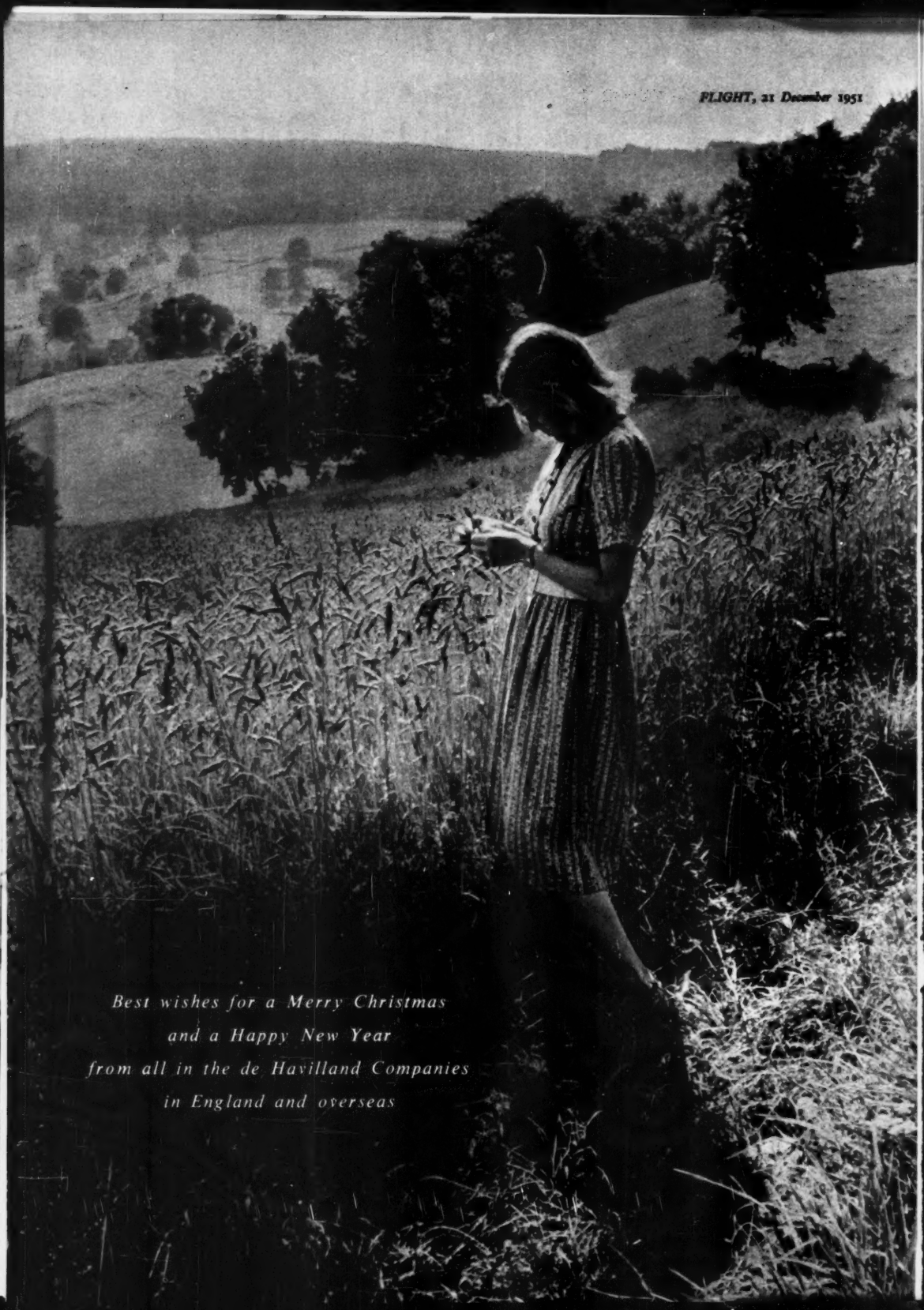


The Directors and Staff of Aviation Traders Ltd.
and their associated companies wish you
a Very Merry Christmas
and a Prosperous New Year

Aviation Traders Limited

15 Gt. Cumberland Place, London W.1

Telephone: **AMBASSADOR 2091** (5 lines) Cables: **"AVIATRADE", LONDON**



Best wishes for a Merry Christmas
and a Happy New Year
from all in the de Havilland Companies
in England and overseas

JETS AND MET. . . .

larly radar-wind stations—are extremely few. Steps are being taken to increase their number, but the amount of upper-air information at present available is very limited and it has not been possible even to begin the development of an upper-air technique applicable to great heights.

There are, of course, a number of pilot-balloon stations giving wind measurements, and their observations are of considerable assistance in preparing forecasts of wind up to about 20,000ft—that is, up to heights at which aircraft at present flying through Africa generally operate; but it is not possible to extend these methods to greater heights. A new approach, therefore, is necessary.

To consider this and allied questions, a meeting of the Meteorological Committee of the Southern Africa Air Transport Council was held in Salisbury last June. At this conference, which I attended in the capacity of chairman, the various methods of obtaining forecasts of winds and temperature up to heights of 40,000ft were examined and certain techniques were recommended. They involve the use of statistical methods to combine mean winds with actual radar-wind observations and are based primarily on work conducted in the Meteorological Office, Air Ministry, though similar work has been conducted in East Africa.

A further study has recently been conducted in my department, using data from the radar-wind ascents which have been made since 1947 from Nairobi. This work suggests that on the vast majority of occasions these techniques will provide information within the limits of accuracy required. In this connection it should be noted that winds at 40,000ft in East Africa are generally very much lighter than those in Europe. The average wind speed at 40,000ft at Nairobi, for example, is about 20 knots or under in all months.

An important feature revealed by the study, however, is that very occasionally strong winds do occur. These winds are similar in some respects to the jet stream of extra-tropical regions in that they are generally confined to relatively shallow vertical layers. They do not reach the very high speeds of the extra-tropical jet streams, the maximum speed so far recorded at Nairobi at 40,000ft over a four-year period being 70 kt, though the speed is more usually of the order of 50 to 60 kt. These winds may persist for several days, but, as already mentioned, they are very infrequent and seem to occur at the most three times in any one year. In all cases the wind has been easterly (080 deg to 110 deg).

Similar statistical techniques for forecasting high-level temperatures were also recommended by the Salisbury meeting and it is hoped that these also will give forecasts of temperature information within the required limits of accuracy. The radio-sonde ascents which have been made at Nairobi since 1947 give valuable information on temperature conditions over East Africa.

Not only must winds and temperatures be forecast at great heights, but forecasts of cloud types likely to reach 35,000 to 40,000ft must also be made. It was for a long time thought that cloud-tops rarely reached above 30,000ft, but Comet operations already conducted in East Africa have shown that tops of cumulo-nimbus clouds may extend well above 40,000ft. As these clouds are frequently associated with severe turbulence, great importance is attached to forecasting their existence, especially along sections of the route to be flown at night.

To assist in this work it was agreed at the Salisbury meeting that meteorological stations should be established on or near the nocturnal sections of the route and that these stations should make observations by day and night with particular reference to the development of cumulo-nimbus clouds. The use of radar equipment for the detection of these clouds was also recommended. The Uganda Government has already authorized the purchase of such equipment for installation at Entebbe Airport, which will be used by the Comet.

Effect of High Cruising Speeds.—The main effect of the high cruising speed of jet aircraft on the meteorological service is that ground organization must be speeded up to ensure rapid interchange of information between airfields and also to ensure efficient preparation and transmission of

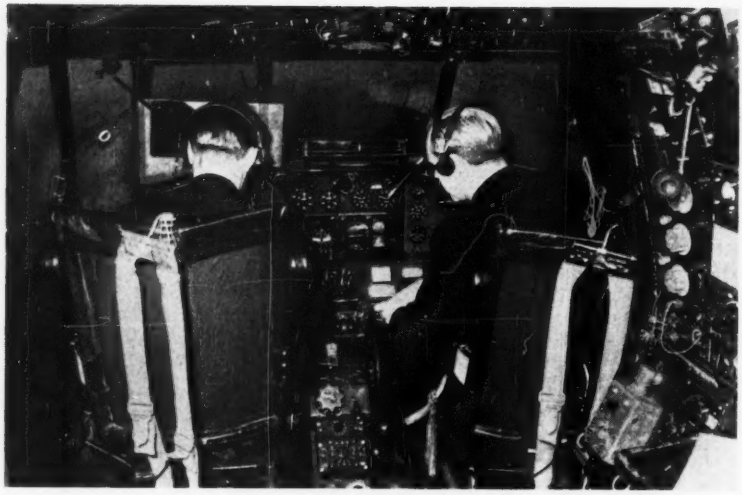
Reading temperature and humidity at an East African station.

information required by aircraft in flight. This is mainly a matter of communications. In a territory such as East Africa it is not possible to have a network of teleprinter circuits linking all the offices concerned, such as exists in the United Kingdom and elsewhere. Wireless is the main means of communication for aviation purposes, and the frequency of thunderstorms makes reception difficult at certain times. These problems are, however, well known to the authorities concerned and further comments by a meteorologist would be inappropriate.

Reduced Endurance at Low Levels.—So far as the meteorologist is concerned, the main effect of the reduced endurance of jet aircraft at low levels is the need for accurate terminal forecasts. Once the aircraft has descended from operational height it cannot wait for a long period to enable unfavourable weather to clear before landing. At Entebbe, a useful aid in giving accurate short-period forecasts will be radar equipment for detecting the location and movement of cumulo-nimbus clouds, to which reference has already been made. As a corollary to this, an efficient diversion system is required to ensure that, if such a course is necessary, an aircraft can be diverted to an alternative airfield before it begins its descent. In East Africa this is particularly desirable, since the distances between of diversion airfields are measured in hundreds of miles rather than in tens of miles as in Europe.

Take-off Conditions.—The performance of jet engines is stated to be very dependent on temperature, especially during take-off. Thus, if maximum payload is to be carried, accurate forecasts of temperature for take-off are required. This is a relatively simple problem for the meteorologist, since the forecast needs only to be given a few hours ahead. It should be noted, however, that temperatures will be required at a specific height above the runway; and over a tarmac runway in tropical sun the readings may be very different from those recorded in the normal way in a screen mounted over a grass surface. In East Africa experiments have been carried out to measure these differences for the main airports.

The foregoing remarks are intended to show that the new meteorological problems are fully appreciated and that all practicable steps towards their solution are being taken. It should not be inferred, however, that the advent of jet aircraft will cause a major upheaval in East Africa's meteorological organization. Apart from the special requirements mentioned above, the same basic meteorological procedures will be provided for jet aircraft as for others and the organization of the Meteorological Department to meet aviation requirements will remain fundamentally the same. Moreover, the work being carried out to solve the special problems will inevitably improve our overall knowledge of the weather processes in East Africa, and will thus in turn benefit all classes of aviation.



Training is never superfluous! From the right-hand seat of a Viking a B.E.A. training captain gives a six-monthly check to a fellow-pilot "from the Line."

AIRLINE PILOT TRAINING

B.E.A.'s Approach to the Problem of Expanding Crew Requirements

ONE of the biggest problems which B.E.A. has had to face during the past year has been a shortage of aircrew to handle the expanded schedules demanded by the heavy traffic of the summer season. Such a shortage is, of course, a serious matter for any airline, as it can prevent an operator from earning the maximum revenue which his route network is capable of yielding.

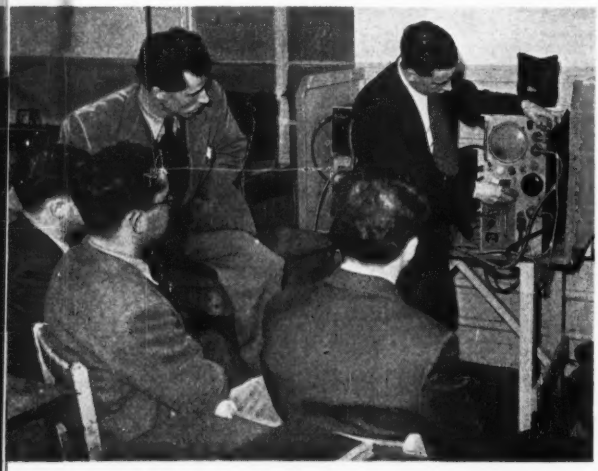
That B.E.A. found it necessary to charter aircraft and crews from B.O.A.C. last June in order to cover the London-Nice night service was not due to lack of foresight : it merely reflected the general scarcity of experienced pilots which was being felt in this country and, for that matter, throughout Europe, too.

In these circumstances it soon became obvious that some lowering of the minimum of experience—though not of the standards—required of pilots on entry into the Corporation would have to follow. It was equally clear that the idea of a career in civil aviation would have to be made considerably more attractive. The fact that the R.A.F., for example, is now offering General Duties officers much-improved conditions has tended to restrict the flow of potential B.E.A. aircrew from this source—though it is true that the recently revised pay-scales for airline pilots—negotiated by B.A.L.P.A.—have persuaded many ex-Service pilots up to the age of about thirty to reconsider the attractions of a civil flying career.

It was necessary, therefore, to implement an entirely new training policy, and whereas previously only pilots holding licences were accepted, B.E.A. is now recruiting and undertaking to train up to the necessary standard men who, though they may have had considerable previous flying experience, possess no licence whatsoever. Under the new scheme the Corporation initially bears the cost of obtaining the necessary licences and the employee repays the money in instalments from his salary. During training cadet-pilots are paid between £500 and £700 per annum, according to qualifications.

B.E.A.'s total strength of "Line" pilots is now about 470 and the requirement up to the end of this year will be 616. Wastage during the last two years has been approximately 30. Some 132 pilots have been recruited this year as compared with 140 last year. Twenty-eight training-captains (who normally serve for alternate six-month periods "on the Line" and with the Training Flight) implement this expanded programme and also deal with the normal routine of "command" and "conversion" courses and captains' six-monthly checks. Flying training is concentrated at Blackbushe, but Link work and some of the ground subjects are dealt with at Northolt.

The varying experience of the pilots now being recruited



Though redundancy is ultimately forseen for radio officers in B.E.A. there is a shortage at the moment; and, as they will be carried in Viscounts and Ambassadors for some years to come, the Corporation is still recruiting them. In this photograph a new batch is seen getting acquainted with some of the equipment they will have to use.

(Left) Under the hood : A climbing turn to starboard is made under the watchful eye of the training captain who has no fewer than six assessments to make on this manœuvre alone. (Right) A general view of one of the two Link trainer rooms at Northolt. Captains are required to carry out a minimum of six hours' Link training in any two months, most of it being devoted to polishing their instrument approach procedures.

calls for some degree of elasticity in the training syllabus but, broadly speaking, the routine followed by the newcomer is as described in the succeeding paragraphs.

Having satisfied himself that the applicant has initial qualifications which meet B.E.A.'s requirements, the superintendent (training) arranges for him to attend a medical board. Then, if found fit, the applicant faces a selection board where he is asked a number of technical questions to ascertain his knowledge of aviation in general and others by which his enthusiasm for the career may be assessed. On being selected, the new pilot is engaged on a contract basis; then, after such formalities as uniform-fitting and inoculations, he reports to the Training Flight.

Of those enlisted under the scheme many are ex-Service pilots, some of whom may not even have flown since demobilization, while others will have reasonably recent experience by reason of the fact that they have transferred from other airlines.

If the trainee holds no licences the Training Unit arranges for him to go to school and study for his Commercial Licence and Instrument Rating. The licence course consists of seven weeks spent at various schools (London School of Navigation, Air Service Training, and the College of Aeronautical Engineering) and covering aviation law, flight operations, air navigation, meteorology and signals. In addition, the cadet studies flight-planning and practical meteorology to obtain his Instrument Rating. After passing the necessary examinations he is given a short refresher course on light aircraft and he also puts in considerable time on the Link trainer to brush up his standard of instrument flying.

Two weeks are spent studying the general technical aspects of the aircraft which the pilot hopes to fly, and he then undergoes an A.R.B. "type endorsement" examination, by which time he will have attained the minimum number of licences necessary for him to fly in the right-hand seat of an aircraft on scheduled services.

A week's refresher on R/T. procedure and equipment, and a further two weeks to assimilate the navigation standards and methods used by B.E.A., and the pilot is then ready to begin his flying training on the particular type of aircraft to which he has been assigned. This involves approximately 20 hours of flying and includes a general conversion to the type, instrument flying, emergency procedures and single-engine work. If the pilot achieves a satisfactory standard he will be posted to his operational flight where, after a short period as a supernumary, he will become a fully operational second officer on scheduled services.

The checking organization will not see this man again for approximately a year, at the end of which he will be required to renew his Instrument Rating. Unless he has exceptional qualifications, a second officer must spend a minimum of one year "on the Line" before he can qualify for promotion to first officer. During this time he must also obtain his Senior Commercial Licence. Promotion is by recommendation only.

After a period as first officer he will eventually accumulate enough seniority to make him eligible for a "command" course. Before taking it, however, he is crewed with a senior captain of the flight with whom he begins his pre-command training. Taken at Blackbushe, the command course is most comprehensive and covers all aspects of the handling of the type of aircraft which he is to operate. Approximately 25 hours of flying are included, together with extensive Link training involving a great deal of let-down procedure work. If he passes his command examination, and provided he has obtained his Airline Transport Pilots' Licence, the officer will then fly as captain of an aircraft under the supervision of a senior captain until the latter is satisfied that he has reached the standard required.

Depending on vacancies existing at the time, the officer is finally appointed a fully-fledged captain. Even when he has obtained his captaincy, however, the days of examination and training are not yet over. B.E.A.'s aircraft-commanders are given a "captain's check" every six months. This involves a rigorous 2½-hour flight, mostly on instruments, and includes the simulation of nearly all possible emergencies. Anyone who has flown on one of these checks—as we were recently privileged to do—will appreciate the exacting standard demanded. In turbulent conditions, for example, we saw the captain cope—with remarkable speed and precision—with the contingency of having his starboard engine cut by the instructor at 110 kt during an instrument take-off.

A captain may also be called upon to undergo a 25-hour conversion to another type or be selected for a 30-hour instructors' course at Blackbushe for appointment to the post of training captain.

Running in parallel with this extensive pilot-training programme there are also radio officers' courses to take care of, for example, this year's intake of 40 operators, most of whom did not possess M.C.A. First-Class Licences on entry. B.E.A.'s radio-officer strength stands at the moment at about 230, and although it has been indicated that the trade will eventually become redundant, the Corporation will still need them for several years for Viscounts and Ambassadors.

E.A.G.R.

CORRESPONDENCE

The Editor of "Flight" does not hold himself responsible for the views expressed by correspondents in these columns; the names and addresses of the writers, not necessarily for publication, must in all cases accompany letters.

Phrenetic Phonetics

ONE assumes that I.C.A.O.—who, I believe, were the originators of the curious new phonetic alphabet laid down in M.C.A. *Information Circular* No. 133/51—have tried it out on sample pilots, radio officers and whatnot of all races, white, black, yellow and variegated, and are satisfied that it works better than the old one. Nevertheless, the thought of having to commit it to memory is depressing; sufficiently depressing, in fact, to induce me to compose an :—

ODE TO THE MEMORY OF ABLE BAKER CHARLIE

Now must I burn the midnight oil
And drink black coffee (Mocha)
Whilst trying to learn my ABC,
My **Alfa Bravo Coca.**

For ere I seek a QDM
From Bagshot Heath to Oxshott
I must speak this odd new tongue,
This **Delta Echo Foxtrot.**

Or else, when navigation fails
As beam winds wax still windier,
I'll drop into the nineteenth hole—
The **Golf Hotel** in **India.**

But if Control's a sleepy type,
A nodder or a dreamer,
Can I raise him with a call
Of **Juliett Kilo Lima**?

And if on V.H.F. I sing
An aria from *Tosca*,
Will the B.B.C. bestow
A **Metro Nectar Oscar**?

Maybe I'll never sing again,
Or croon a vo-de-do,
For nothing's Roger any more,
But **Papa Quebec Romeo.**

And when across the stratosphere
Rad. Offs. hold communion
This jargon binds them rigid too—
Sierra Tango Union.

I'd better learn it, all the same—
To do without seems risky;
I'll wrestle nightly with myself
And give the **Victor Whisky.**

But two is company, three is none,
And when I fly with Lulu
I'll leave this awkward Odd Man Out,
This **Xtra Yankee Zulu.**

Surbiton, Surrey. FLIP.

Detachable History

I SHOULD like to express my appreciation of the Sopwith-Hawker history in your November 30th issue, and in particular the way in which it was made so easily detachable from the rest of the issue for reference purposes. Whether this was an accident or done by design, might I request that you do the same for any future articles of this type?

In the article on Tony Cole, in the same issue, the author mentions the Fokker G-EBUT at Croydon. Might I respectfully point out that this was not a Fokker F.VII, but a F.XI or Universal (previously on the Register of Kenya as VP-KAB, incidentally).

Leicester. D. A. S. McKAY.

[Special features of the type referred to are made easily detachable whenever printing conditions permit.—ED.]

Electrical De-icing

I WOULD like to say a few words in reply to the interesting remarks of Mr. P. C. Hodge (*Flight*, September 21st) about my article (August 31st) on aircraft icing. I am sorry about the delay, but it takes a long time for *Flight* to reach Australia.

Although, in theory, there is an increase in the thermal capacity of heated aircraft-skin with gradually thickening ice deposits, this is hardly noticeable in practical operation of cycling electrical de-icing. The question of time comes into it. If the temperature-rise of the pads were very slow, some of the heat supplied would have been used to warm up the whole quantity of ice accumulated on the pads. In practice, however, the temperature-rise of the pads is very rapid and ice begins to melt from the inside almost immediately the current is applied to a given pad. The bond between the pad and ice is destroyed and ice is removed by the airstream before any appreciable quantity of heat is lost by conduction to the rest of the layer of ice.

There is another point which your correspondent seems to have overlooked when mentioning that in very severe icing conditions the rate of heating might not be sufficient. Severe icing, as it is well known, occurs at "high" ambient temperatures (between —10 deg and 0 deg C); hence, even if there were some heat-loss to ice by conduction to it, this loss would be small, due to the relatively high temperature of ice itself. At really low temperatures the ice deposit is usually very small.

Finally, I did not imply that *any* electrical de-icing would afford complete protection, but gave a set of figures for the rates of heating which had been found to do the trick in practice.

Melbourne, Australia. S. S. SCHAETZEL.

Admiralty and Coastal Command

MAY I reply briefly and, so far as I am concerned, finally, to "Icarus" (Correspondence, December 7th)?

(1) My contention is that Coastal Command *is* air power.

(2) Training has been my immediate responsibility for years, but it must conform to requirements of an operational nature.

(3) With regard to the last sentence of "Icarus's" letter, neither can the Royal Naval Air Service be fully efficient while sea-time and sea command are the crux of promotion.

Epsom, Surrey. W. N. CUMMING.

IT is to be hoped that "Icarus" is stronger on argument than he is on analogy. A three-legged stool is a tripod. Lengthen one leg as much as you like, it will stand firm, though not level. It will not wobble.

London, S.W.7. MILKMAID.

In Praise of Proctors

I NOTE in the Civil Aviation "Brevities" column of *Flight* for November 23rd that Proctor G-AIEV is bound for Muttaburra, Queensland. May I say that before it was acquired by Mr. Loxham (and, possibly, previous owners) I had this same aircraft demonstrated to me by Mr. J. Carol of Percivals in 1947. As a result of this demonstration I subsequently acquired a Proctor for my own use. Whoever is to be the next owner of G-AIEV will be assured of a fine aircraft, and one which, no doubt, has convinced many people of the fine performance and versatility of this Percival product.

Peterborough, Northants. H. LAW, ex-A.T.A.

[The Proctor referred to was one supplied by W. S. Shackleton, Ltd., to Somerset Airways in Queensland.—ED.]

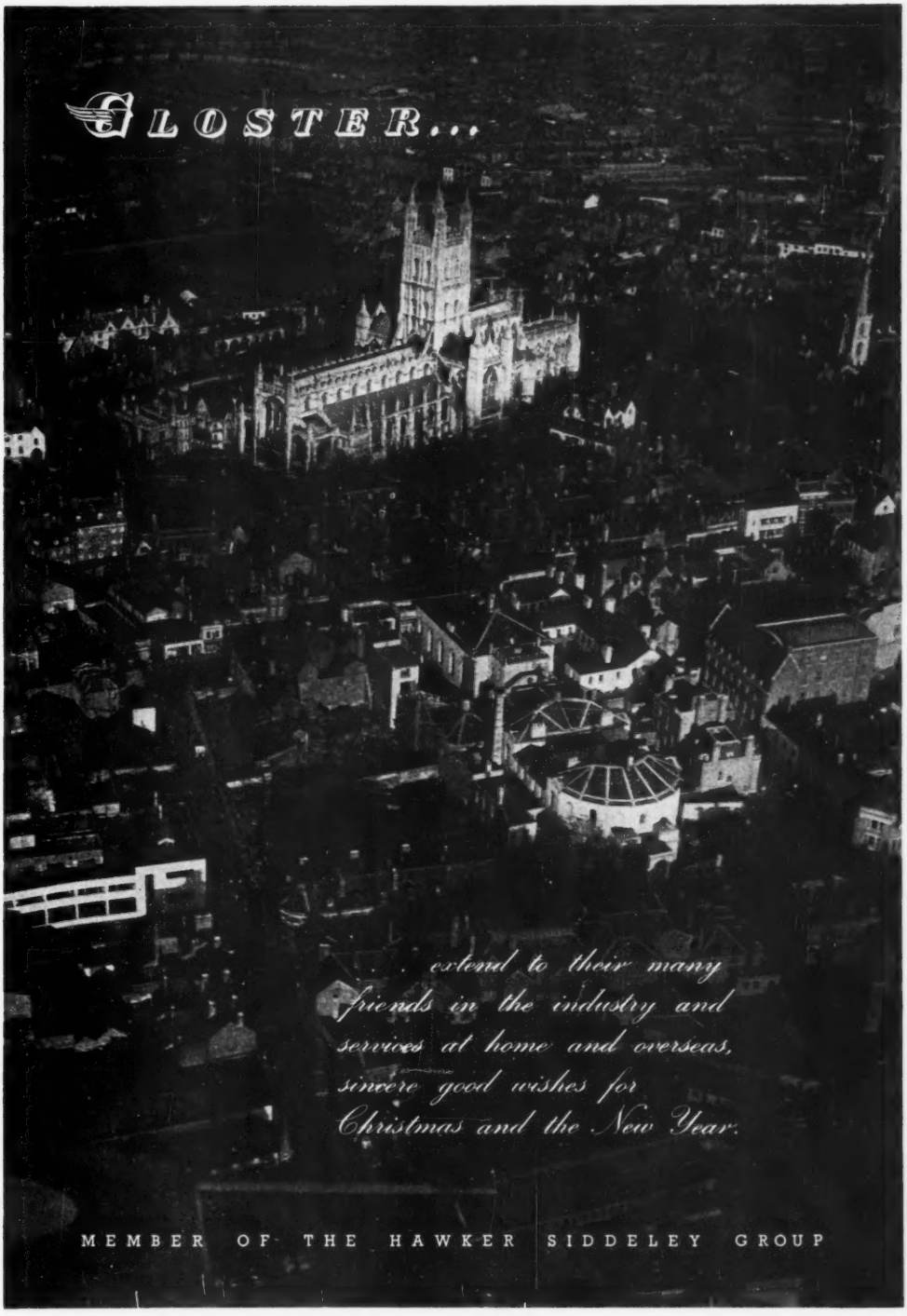
Deserving Cause

From Major the Earl of Ancaster, T.D.

AS your readers are aware, although there has been a general increase in all prices, wages, and benefits, the rate of pensions for disabled ex-Servicemen has not changed and the 100 per cent disability pension of 45s a week is today worth only 21s 8d by comparison with 1938 purchasing values. Hardship is felt today by many limbless ex-Servicemen, 90 per cent of whom do not receive any of the recently improved supplementary allowances. The British Limbless Ex-Servicemen's Association's welfare fund exists to help these cases of hardship, and the branches throughout the country examine local cases of individual distress. Last year 828 cases were helped and £5,816 expended on welfare alone.

B.L.E.S.M.A. also maintains a home for limbless men which was opened in 1949 by Her Royal Highness the Duchess of Gloucester. All the beds have been continually occupied, mainly by veterans of the 1914-18 war who have no dependents or relatives to look after them and whose average age is now 60, but also by younger members in need of a period of convalescence or rehabilitation. Costs of running the home have increased each year and £7,000 a year has to be raised by voluntary subscriptions.

B.L.E.S.M.A. is an organization run by limbless ex-Servicemen, who understand the very special problems, to help their less fortunate comrades. Funds are urgently needed for our extended work, and I should be grateful if you would bring this appeal to the notice of your readers who responded so generously in the past. The hon. appeal director's office is at 31, Pembroke Road, London, W.8. ANCASTER.


GLOSTER...
. . . extend to their many friends in the industry and services at home and overseas, sincere good wishes for Christmas and the New Year.
MEMBER OF THE HAWKER SIDDELEY GROUP

VANDERVELL
Thin Wall Bearings
SERVE ALL BRANCHES OF THE
ENGINEERING INDUSTRY
LTD
THIS MARK
ON ALL VANDERVELL
PRODUCTS
VANDERVELL
PRODUCTS LIMITED
WESTERN AVENUE PARK ROYAL LONDON W3

Smee's V76

Commercial Aviation Commentary

By HENRY MORRIS Series II: No. 2

THE idea of a British Chamber of Air Transport—on the lines of the Chamber of Shipping—is being strongly supported in several quarters. It has been simmering in some minds for quite a time but has not been openly expressed, for its objectives and processes would obviously have been out of step with the policies of the late Government. The sponsors feel that it is essential for Britain's air-transport industry to be able to speak with a united voice not only to the United Kingdom Government but to foreign Governments and to International official bodies—and, when necessary, to bring pressure to bear.

To justify its existence, of course, such a body would have to include both the nationalized side of the business *and* the independent operators. The Corporations would have to recognise that there is a permanent place in the business for the independent operators; and the independent operators would have to recognize that the Corporations—more or fewer of them, as the case may be—are here to stay. Little love has been lost between these two sides in the past, and it requires something of a feat of imagination to see either of them voluntarily joining in the formation of a B.C.A.T.

It seems inevitable that the catalyst in any such proposed *rapprochement* must be the Minister of Transport and Civil Aviation himself. If the Government's policy (as the recent statement in the House of Lords implied) eventually means definite spheres of operational opportunity for the State Corporations *and* the independent operators, and the Minister says he would like to see a representative body which would work out some form of *modus operandi* in the various spheres, then the Chamber of Air Transport would be as good as formed.

Once the present warring elements started deliberating in what would be respected and respectable Councils of the Chamber, many difficulties could be adjusted and some would in fact, fade away. The Minister would be saved the time and effort he would otherwise have to expend in trying to reconcile the present factions, who are barely on pleasant speaking terms. Moreover, such a powerful Chamber could do much towards raising the general standards—both technical and commercial—of the British industry and, in fact, membership would soon become a *sine qua non* for any respectable operator. It is certain that more will be heard of the idea.

* * *

ONE sees signs that the new Government is beginning to believe that a brace of its current headaches—contributed by two sides of the aviation industry which in the past have had far too little to do with each other—may have a common cure, or at least a common anodyne. Headache No. 1 is the serious manpower shortage in the aircraft industry; No. 2 is the problem of what to do with British air transport. At first sight they may seem only vaguely connected, but the more they are examined the more interwoven they appear.

Contact between the two is made at a simple common point. The independent operators claim that, given greater freedom of enterprise, and a stronger lead by the Government in eliminating many of the restrictions and controls which at present enmesh the industry, then British air transport potential could be greatly increased. This would mean a much greater home market for the best payload/transport aircraft our manufacturers could produce.

The manufacturers for their part are more than disturbed about the woefully deficient rate of manpower recruitment to the industry. Unless something can be done drastically and immediately, the factories will fall far behind on rearmament orders, let alone on construction for the civil market.

Meanwhile, American constructors, notwithstanding their own defence commitments, are turning out new and most efficient transport aircraft in ever-increasing numbers; and that is a fact which serves to put our own position into even more depressing perspective. The prospect of a drying-up of British supplies is a current nightmare to all U.K. operators.

For years the British independent companies have been preaching the policy of encouragement of private enterprise and endeavouring to draw attention to the strategic importance of a strong air transport reserve; but their voices have been weak and isolated. Now, it seems, the new Government may say to them: "Right, we'll give you a chance. We will let you apply for permission to run certain types of scheduled, semi-scheduled or non-scheduled services. We will give you, say, a ten- or fifteen-year security of tenure. If you have the aircraft and the finance, get to it."

Under such a lead the independent operators would no doubt secure the finance; but procuring aircraft would be a very different matter. Because of the policies of the past few years—both those followed by the last Government and those imposed internationally—not a single U.K. operator could risk big capital in the ordering of new aircraft. The sad vista of one concern after another going out of business—apparently completely unmourned by the authorities—made air transport a very bad investment risk. So the few surviving independents find themselves with a motley collection of aircraft, much of it R.A.F. surplus, or redundant or obsolete Corporation types. The operators would not feel so despondent if they could say to the Government: "Fine, we will now place orders for a lot of new British types; we'll begin operations with our existing equipment or will lease aircraft from the Corporations or overseas operators; then the types we will be ordering from the British manufacturers will form a sound foundation for considerable export orders." A lovely pipe-dream; the reality, of course, is that the manufacturers are now likely to say that, far from welcoming new orders of this kind, they hardly know how they can cope with the military demands, and that even the few aircraft on order for the Corporations may have to suffer.

* * *

THIS, then, is where the two headaches merge and become twice as painful as one. If the constructors had the manpower they need they could probably produce sufficient transports to meet the potential British demand and also build up the biggest dollar-earning export trade in the country. And if the operators had the aircraft—or were certain of getting them—the British air-transport effort could be expanded almost indefinitely.

Equally, however, it is at this point that we begin to see possibilities of relief, if not of cure. The recruits are not going into the aircraft industry, possibly because the technically-minded youth of today is hesitant about entering an industry which seems to be almost exclusively pre-occupied with the rearmament drive—there are too-recent examples of sudden "retrenchment" in aircraft factories, and now there is also occasional talk of disarmament. But if a large slice of the aircraft industry was firmly committed to long-term orders for civil types, and if the manufacturers themselves advertised beyond all doubt that they intended to do everything in their power to concentrate on the export trade and the commercial home market, then the recruitment might well be greatly accelerated.

At this point they are almost certainly beginning to think again about the home market for transport aircraft, and to wonder whether the odd two or three dozen types on order by the Corporations would, in fact, represent the actual potential market if the Government set out to encourage the maximum development of British air transport. Incidentally, they are probably wondering, also, whether they would not have done better by supporting the free-us-from-restriction pleas of the independent operators instead of relying solely on the Corporations to provide the total home market for large civil air transports.

LONDON SCENE: Now that the Hermes IV is firmly established in service with B.O.A.C., it is one of the most frequent callers at Heathrow. The Corporation has now received all the 20 Hermes IVs ordered from Handley Page Ltd.

CIVIL AVIATION

MORE COMETS FOR U.A.T.

LAST May the de Havilland Aircraft Company was able to announce that the French shipping concern Chargeurs Réunis had signed a purchase contract for two Comet Series I aircraft for the replacement of piston-engined aircraft now used on the routes of its associate company, the Union Aéromaritime de Transport, whose operations connect Paris with French Equatorial Africa and Indo-China. Recently a further contract has been signed, increasing the number to three Series I Comets. Chargeurs Réunis also holds an option for a number of Series II Comets, powered by Rolls-Royce Avons.

Delivery of the Series I aircraft is expected to begin next autumn. Meanwhile, arrangements are being made for their prompt introduction on the company's routes to Africa and the Far East.

UNITED'S "COACH" EXPERIMENT

WITH the object of tapping experimentally the mass travel market with the lowest cost "coach" service ever offered across the American Continent, United Air Lines have submitted new "coach" fare proposals to the C.A.B. These call for one-way fares of $99 eastbound and $88 westbound between New York and San Francisco, and proportionately low fares between Chicago and San Francisco and Chicago and New York. The new rates, which are exclusive of federal transport tax, are to apply to United's present daily round-trip "coach" schedules between the two coasts.

The company is actually asking for rates which previously have been offered only by non-certificated irregular carriers operating to points of their own choosing. United's move, therefore, represents a new venture in the field of scheduled airline operations. Present coach fares vary widely, according to segment and direction being flown; the western fares are, generally, lower than those in the other direction. A comparative fare now being charged for the New York-San Francisco run is $110. For coach operations the company uses 66-passenger DC-4s which have unpressurized cabins and operate on slower schedules than the company's standard-fare, pressurized DC-6s.

Explaining United's move, the company's president, Mr. W. A. Patterson, pointed out that, because the scheduled carriers have had the responsibility of maintaining services to a great many cities, they have so far only entered the "air-coach" business on a rather conservative basis, offering rates which approximated to 4½ cents per passenger mile as compared with the standard fare of 6 cents per mile.

Meanwhile, he said, the so-called irregular operators, having no obligations to serve traffic centres regardless of whether they provided high or low load-factors, had been tapping this market only at the metropolitan centres. United now felt that the time had come to determine whether scheduled airlines also could cut their fares to 3½ cents per mile. The experiment will be watched closely and, depending on its economic result, United will either abandon or expand low-cost operations.

AIRLINE STRIKE IN BRAZIL

AT the time of going to press there is still no news of settlement of the strike of airline personnel that has paralysed all internal air services in Brazil since midnight on Friday, December 7th. More than 15,000 employees are demanding a 15 per cent increase in wages, retrospective to the middle of the year. The President intervened personally in the dispute, authorizing increased fares to meet the wage demand, but some companies have claimed that, as they are already operating at a loss, fare increases will only cause their financial position to deteriorate.

While five airlines have agreed to the wage demand without reservation, others are prepared to pay the increase only from December 1st. Employees' unions have stated that the strike will be continued until all companies comply with their demands, and it has already been hinted that unless there is early agreement the Government may take over all airlines as an emergency measure.

DOUGLAS LIFTMASTERS ORDERED

ONE of the world's largest all-freight carriers, the American Flying Tiger Line, has announced an order for seven new DC-6a Liftmasters, the biggest commercial freighter now flying. The total cost of this equipment will exceed $7,000,000. The company now uses 37 C-54s and C-46s on an extensive freight network, and the additional aircraft will form part of a national expansion programme to deal with the rapidly increasing volume of freight traffic throughout the United States.

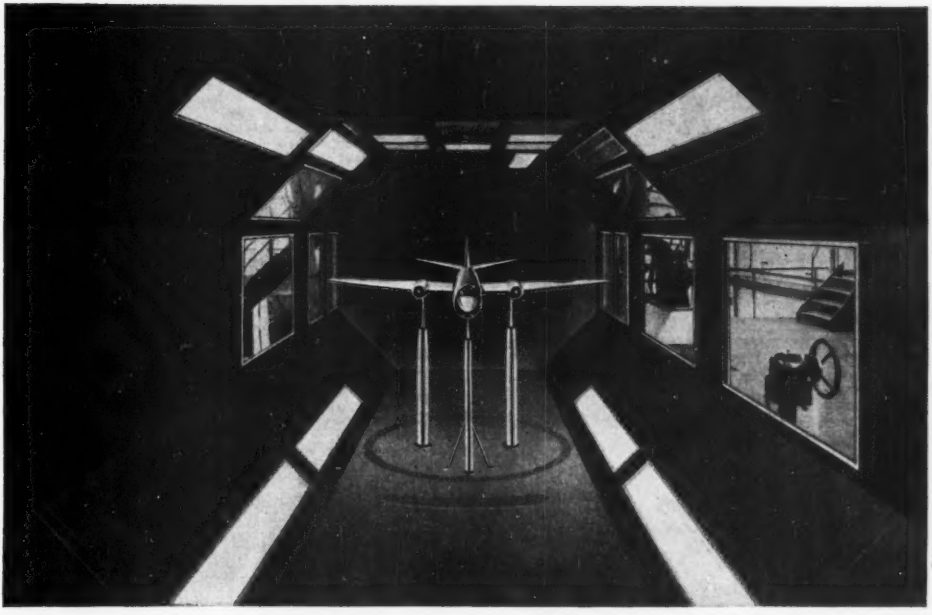
It will be recalled that the Liftmaster has a cruising speed of over 300 m.p.h. With modifications which the company is planning, these aircraft will be able to lift a payload of more than 35,000 lb. The gross take-off weight is 103,000 lb as compared with the 70,000 lb of the C-54.

VISUAL POSITION PLOTTER

SINCE it first appeared about three years ago, the Marconi V.H.F. D.F. equipment (Type AD.200), which presents bearings of a calling aircraft on an 8in dial, has achieved considerable popularity. This company has now designed an attachment for the equipment which enables the actual position of the aircraft to be located automatically and instantaneously. The installation is unique in that it provides bearing information over long distances by means of telephone or radio links, so that two or more stations can thus be sited at widely separated points. These will give suitable base-lines in any direction, and their combined intelligence is interpreted at one central point by means of remote repeater indicators. Bearings obtained are projected on to a translucent map by an adaptation of the epidiascope principle. Five-inch bearing indicators, with black dials and white pointers, are used in conjunction with wide-angle, short focus lenses. Illumination is by means of mercury-vapour lamps. Vertical or horizontal displays can be used, and the equipment has been designed as a kit of parts from which the user can build up the type of presentation most suitable for his needs.

A demonstration was recently given by the Marconi Company to delegates at the Commonwealth Conference on the Operation of Jet-powered Aircraft, in which two twin-channel AD.200 sets were used. One was sited at Bedells End, Essex, and the other at Hatfield. The latter installation was 35 miles from the demonstration point at Great Baddow, and worked through normal telephone exchanges with the aid of only one repeater unit; the total line length was 54 miles. Two narrow beams of light on the

'ENGLISH ELECTRIC'



Wind-tunnel Drives

'ENGLISH ELECTRIC' design and manufacture wind-tunnel drives, as well as complete test plants for reciprocating and turbine-type engines, superchargers, compressors and other engine auxiliaries.

The illustration shows a model of the world famous 'ENGLISH ELECTRIC' Canberra twin jet bomber in the working section of a subsonic wind-tunnel powered by 'ENGLISH ELECTRIC' equipment.

The ENGLISH ELECTRIC Company Limited

QUEENS HOUSE, KINGSWAY, LONDON, W.C.2

Plant Sales, Stafford

Works: STAFFORD · PRESTON · RUGBY · BRADFORD · LIVERPOOL

M15.6

An Announcement . . .

DUREX ABRASIVES LTD wish to announce that as from June 14th, 1951, the name of the Company has been changed and is now the MINNESOTA MINING & MANUFACTURING COMPANY LTD.

Identification will be as before, except that the words "Scotch Boy" will be used instead of "Durex" as a prefix to the name of the material, e.g., "Scotch Boy Tapes" instead of "Durex Tapes"

Existing high standards in the quality of the products will be maintained, the change is in name only.

'SCOTCH BOY' *Masking* TAPE

"SCOTCH BOY" Masking Tape is supplied in rolls 72 yds. long and in a variety of widths

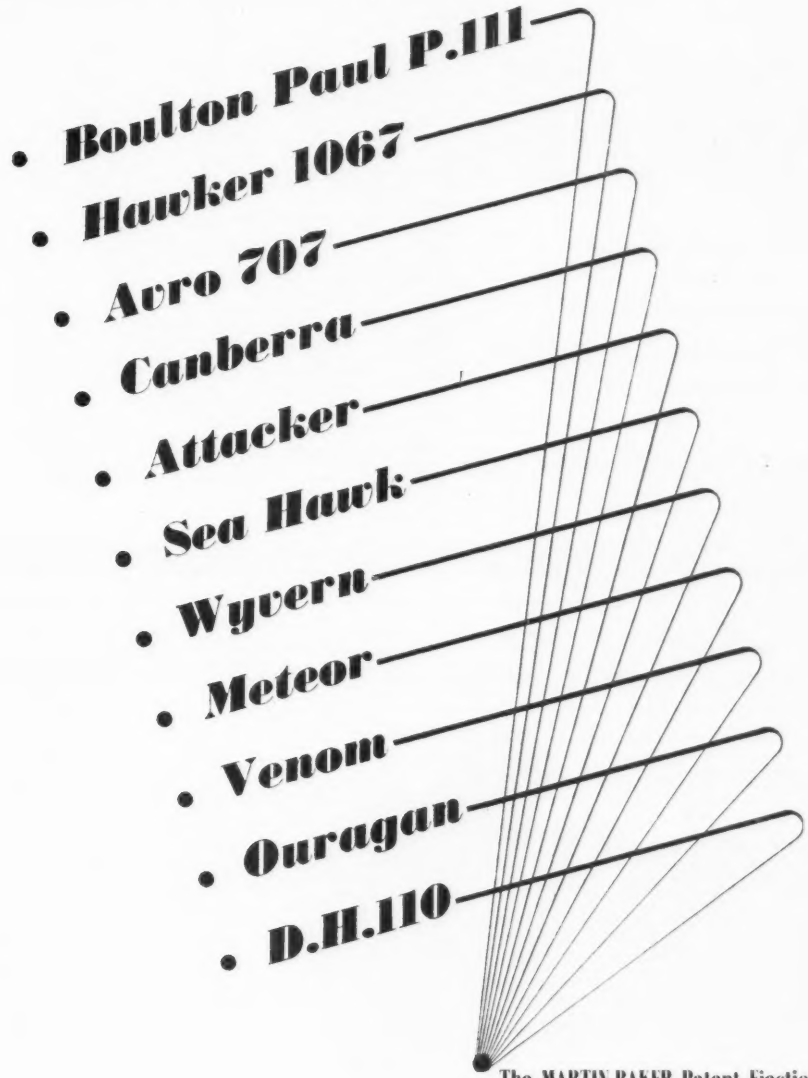
DISTRIBUTIVE ARRANGEMENTS UNCHANGED

Manufactured by :—

MINNESOTA MINING & MANUFACTURING COMPANY LIMITED

ARDEN ROAD • ADDERLEY PARK • BIRMINGHAM, 8

'EJECTION SEATS'



The MARTIN-BAKER Patent Ejection Seat—live-tested and proved—is standard equipment for all high-speed aircraft.

MARTIN-BAKER AIRCRAFT CO., LTD., HIGHER DENHAM, NEAR UXBRIDGE, MIDDX.

ALUMINIUM ALLOY STAMPINGS

A specialist organisation
with extensive
manufacturing facilities for —

FORGINGS-STAMPINGS
SECTIONS-TUBES

Southern Forge LTD

IN ASSOCIATION WITH ARGUS ENGINEERING FARNHAM ROYAL BUCKS

MEADFIELD ROAD · LANGLEY · BUCKS · *Tel:* LANGLEY 301

The Latest in Small Actuator Design!

E.R.J. 60 Mk. 6 (ROTARY)

SPECIFICATION

Weight	28 oz.
Max. Torque	90 lb. in.
Angular Movement	90
Nominal Operating Torque	60 lb. in.
Operating Time	1.8 sec.
Consumption	3.6 amp.
Finish	Grey
Voltage	24 D.C.
Rating	1 min.

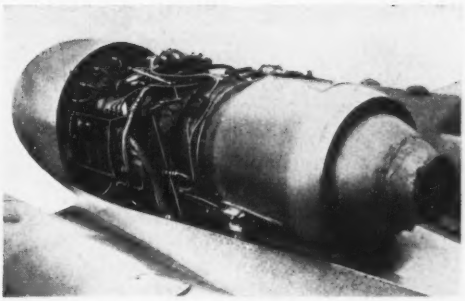
When ordering please quote Part No. MAA 1501

WE TAKE THIS OPPORTUNITY OF WISHING ALL OUR CUSTOMERS A HAPPY CHRISTMAS AND EVERY SUCCESS IN THE NEW YEAR

Telephone: SONNING 2351

WESTERN MANUFACTURING ESTATE LIMITED

AIRCRAFT DIVISION · THE AERODROME · READING · BERKS



FIRST TIME UP: An experimental French ducted-fan turbojet, the Turboméca Aspin I, of 200 kg static thrust, flew for the first time last month as the power unit of the Fouga Gemeaux IV depicted here. No performance figures have been released, but, whatever the speed, it is likely to be handsomely surpassed by that of a further variant—the Gemeaux V—now being fitted with the more powerful Aspin II, of 360 kg thrust.

CIVIL AVIATION . . .

map indicated the two bearings taken on the aircraft and presented continuous fixes. One advantage of the system is the fact that a calling aircraft operates a relay in the receiver; this relay automatically illuminates the map and thus draws attention to the fact that fixing is taking place.

VISCOUNT'S TROPICAL TRIALS

HAVING completed extensive tropical and high-altitude flight trials in Africa, the prototype Viscount 700 returned to this country on November 30th (a photograph of the homecoming appeared in our last week's issue). The trials, which extended over eight weeks and entailed a total of 105 hr flying, were under the management of W.Cdr. G. E. Lowdell, while the aircraft carried representatives of B.E.A., the A.R.B. and a number of Vickers technicians. The water-methanol injection system with which the Dart R.Da.3 turboprops powering the machine are fitted was found to perform with complete success during the take-offs from Khartoum and the high-altitude airfields at Nairobi and Entebbe. Only routine maintenance was required to both the engines and airframe, which were said to have been "remarkably trouble-free" throughout the tour.

In addition to these trials, the Viscount was demonstrated at Salisbury and Johannesburg to representatives of the South African Government and local airlines, who were all enthusiastic about the low noise-level and the smooth running, qualities, as experienced in the passenger cabin.

C.P.A. COMET PLANS

IN preparation for the introduction of D.H. Comets on Pacific services next year, Canadian Pacific Airlines have already formulated training programmes for their maintenance and flight personnel. The first aircraft is expected to be delivered to Vancouver in August or September of next year and training will take place at Vancouver. Route-familiarization flights will also be carried out at that time. A nucleus of ground-crews will visit this country to be trained in Comet maintenance and, in addition, de Havilland personnel will, in the initial stages of operations, be stationed at intermediate points along the route.

The present plan indicates that the Comets, fitted with 44 sleeperette seats, will operate a twice-weekly schedule from Australia to New Zealand and Honolulu, to connect at the latter point with DC-6B flights to Vancouver. The flight between Honolulu and Sydney will be made in just under 10 hr, thus reducing the time for the present schedule by half.

C.P.A.'s Comets will be modified-wing, long-range versions having a total fuel capacity of 7,000 gal. The aircraft will be serviced in Australia, the engines being handled by the manufacturers, while A.N.A. will look after airframe maintenance.

SILVER CITY'S NEW FREIGHTERS

THE Bristol Aeroplane Company has announced that, as mentioned briefly in *Flight* last week, Silver City Airways have placed an order for six specially built, long-nosed Bristol Freighters; the order is worth over £500,000. The new machines will be able to carry three small cars instead of two, together with 20 passengers instead of the 12 carried by the eight existing Freighters which the company now operates. The overall length of the fuselage is to be increased by 4ft 10in to give a cargo-space length of 37ft.

The Freighters' exterior, also, will be radically changed. The bulbous nose will have extra length and will be streamlined to meet the nose doors which will, of course, be positioned much further forward of the cockpit. A larger fin and rudder will also be fitted to compensate for the increased side-area. The order is, incidentally, the largest ever placed for new equipment by any post-war free-enterprise operator.

Silver City's car-ferry operations on the Lympne to Le Touquet route are already well known; last year the company carried over 13,000 vehicles on this run. Plans for the future include a similar service between Southampton and Cherbourg and, possibly, another from Southend to Ostend.

HOW TO GET AN AIR SERVICE

AN interesting example of the complex methods of argument which must often be entered into before the benefits of air travel can be brought to outlying districts is to be seen in representations made by the Tobermory Town Council for the inauguration of a B.E.A. ambulance service between Renfrew and the Isle of Mull, situated among the remote Western Isles.

The M.C.A.'s reply to the request that an airstrip should be built on Mull for this purpose contained five negatives: no site, no money, no helicopter, no hope and no promise. The Council, however, had replies ready for at least four of these points.

On the question of a site, it was argued that a recent survey had shown a site at Glenforsa to be suitable as an ambulance airstrip, that Capt. Barclay of B.E.A. had also described the area as suitable and, furthermore, that there was also a possible area at Gruline.

As regards money, the Council said that people of Mull were not asking for the expenditure of a large sum; they simply wanted to tap the existing ambulance service operating from Renfrew. In any case, it was pointed out that the figure quoted by the M.C.A. for providing the airstrip was only £2,000 and that, if given official encouragement, the Council would lead an island campaign to recruit volunteer labour to assist in tree-felling and ground-levelling. The Council argued also that, far from causing an additional drain on the Exchequer, such a service, by increasing the area covered by the Renfrew flights, might help to augment their earning power.

The Council members expressed surprise that since the inception of the National Health Service, the introduction of this ambulance service should apparently have become an even more remote possibility, and were even able to cite instances in which ambulance aircraft had operated from the island prior to 1939.

On the subject of helicopters, this determined little community pointed out to the M.C.A. that single-engined aircraft of this type were now being used extensively in Korea and even in the United Kingdom for passenger traffic, and—so far as the Ministry's ban on single-engined helicopters flying over water was concerned—they thought that any patient urgently requiring to be taken to hospital would consider the personal risk of a helicopter breakdown as being small when compared to the physical dangers attending an eight or nine hours' delay in journeying by road and sea to the limited medical services available at Oban. In any event, says the Council, the strip of open water over which the M.C.A. appears to be so concerned is only three miles wide.

The Council has forwarded a copy of its answers to the M.C.A., the Department of Health, the Western Region Hospital Board, the Secretary of State for Scotland and the principal Scottish newspapers. As a parting shot, also, the elders of Tobermory are calling the attention of the authorities to the fact that a helicopter actually landed on Mull in the past few months with an air official making a personal visit.

It seems to us that enthusiasm of this sort for the development of air services is a heartening sign of its general acceptance. If only for their enthusiasm, the people of Mull deserve their airstrip.

CIVIL AVIATION . . .

BREVITIES

THE de Havilland Comet at present on loan to B.O.A.C. in advance of its contract delivery date made a test flight from London to Rome and back on December 6th. Airborne times for the flight were : outward, 2 hr 15 min; return, 2 hr 20 min.

* * *

A new airfield which has been built at Yesilkoy, near Istanbul, will be opened to regular international traffic on May 1st, 1952. It is one of a ring of new airfields in Turkey which have been situated with a view to accommodating all types of aircraft on a year-round day and night basis.

* * *

Fifty race-horses, valued at more than £300,000, have been flown across the Atlantic this year by K.L.M. Because of the increasing use of air travel by bloodstock-breeders on both sides of the Atlantic, K.L.M. have devised special mobile horse-stalls and loading ramps for use in conjunction with their DC-4 freighters.

* * *

After successfully landing in bad visibility at London Airport last week, an Air France commander found himself in the embarrassing position of being lost on the runway for no less than two and three-quarter hours. His 33 passengers amused themselves by drinking champagne and playing cards until a tractor search-party finally managed to find their quarry and tow it to the terminal building.

With the object of stimulating winter travel in Scotland, B.E.A. is introducing excursion fares on its Inverness-Stornoway route, which is served by Pionairs three times weekly. The new fares, reduced by about 25 per cent, will operate experimentally for three months from January 1st.

* * *

Although, at the time of going to press no official announcement had been made, it is understood that delegates to the I.A.T.A. Conference at Nice had agreed on a tourist-class tariff for air travel in Europe. The percentage reduction is believed, however, to be less than that offered on transatlantic tourist flights.

* * *

The Australian Minister for Civil Aviation has approved the purchase by Q.E.A. of two more Super-Constellations for use on the company's Australia-London route. Delivery of these aircraft, which is expected towards the end of 1952, will increase to three the size of Q.E.A.'s Super-Connie fleet.

* * *

Air Ceylon (flying the London-Sydney sector) and A.N.A. (operating between Sydney and Cairns) have recently completed a series of successful shipments of orchid plants from England to Queensland, which is said to be their natural home. The plants being shipped in this fashion are perfected hybrids with which the Queensland growers intend to improve their own production of orchids.

CLUB AND GLIDING NEWS

AS mentioned briefly in *Flight* of November 23rd, the 1952 International Gliding Contests are to be held at Huesca, in Spain, and will probably begin at the end of June. The British Gliding Association hopes that, as in 1950, British pilots and sailplanes will be well represented at next year's contests. This, however, cannot be achieved without financial aid, and if the United Kingdom is to be represented a sum of approximately £4,000 must be found for the team's expenses. Last year pilots and crews from this country paid their own expenses, but they cannot afford to do so again. Although five Slingsby Sky sailplanes, retrieving vehicles and radio gear have already been lent by the manufacturers and by clubs, and the Spanish authorities have agreed to meet all expenses incurred while the teams are in Spain, there are still many other costs involved in carrying out an expedition of this nature. These include transport charges, subsistence *en route*, insurance, repairs, certain hire charges, and entry fees.

Having regard to the efforts which have been made to improve gliding technique and equipment in this country, the importance of this sphere of aeronautics generally, and the value of British representation at a world event of this nature, the B.G.A. hopes that an appeal to the public, and in particular to its friends in the aircraft industry, will meet with immediate support. Anyone desirous of contributing is invited to send his donation to the British Gliding Association, Ltd., Royal Aero Club Aviation Centre, Londonderry House, 19, Park Lane, London, W.1.

FOLLOWING closely on the announcement of the Herts and Essex Aero Club's total of flying hours for 1951, the Wiltshire Flying Club now states that its members have flown some 2,420 hr for the period January to November, a figure which exceeds that of the corresponding period last year by over 600 hr. Up to December the club had averaged more than 200 hr each month throughout the year.

Of the eight A.T.C. cadets allotted to the W.F.C. for training during the year, all completed their courses and obtained their P.P.L.s, most of them within 14 days from the date of their arrival at Thruxton. During the year, also, the club's maintenance organization has overhauled over 50 aircraft for C. of A. renewal. A.R.B. approval was obtained for the complete overhaul of Cirrus Minor II engines, which is undertaken either on an exchange basis at a cost of £100 or at an inclusive cost of £70 if the engine is consigned to Thruxton. The aircraft-sales side of the club's activities has also been flourishing, and it is stated that these transactions have averaged three a month.

There is news from Thruxton, too, of a new aircraft-construction venture. This is the building of a little single-seater rejoicing in the name of the "Thruxton Dingbat." No further details are at present available other than that W.F.C.'s chief engineer, Mr. John Curry, is in charge of the project. The club hopes that it will be flying before the 1952 racing season and implies darkly that the "Throttle Benders" will then have to look to their laurels.

PARTY-GOERS : Lined up for the camera at the recent Herts and Essex Aero Club ball (a description of which appeared in Flight last week) are, left to right, Mr. Peter Ayles, the club's C.F.I.; Mrs. Darlow; the Secretary of State for Air, Lord De L'Isle and Dudley; Lady De L'Isle and Dudley; Mr. A. R. Saward, hon. flying instructor; Mrs. Saward; Mr. A. R. Frogley; and Mr. F. E. Darlow, secretary.

"Flight" photographs

MARCH PAST: The Cadet Wing of Cranwell College marching past the reviewing officer, Gen. Sir Gerald Templer, at last week's graduation parade. (Right) The King's Colour and the Senior Entries march off to the strains of "Auld Lang Syne."

SERVICE AVIATION

Royal Air Force and Naval Aviation News

Congratulations to His Majesty

ON Friday last the following message was sent to the King by the Secretary of State for Air, Lord De L'Isle and Dudley, V.C.: "On the occasion of the resumption by Your Majesty of the full powers of State, the Air Council offer their humble duty and assurance of the profound sense of satisfaction with which this news has been received by all ranks of the Royal Air Force. They further beg leave to offer the heartfelt congratulations of the Royal Air Force on Your Majesty's recovery and their loyal wishes for the complete restoration of Your Majesty's health."

The last R.A.F. function the King attended was the presentation of the Lawrence Minot Trophy to No. 617 Squadron on November 8th, 1950.

Cranwell Graduation Parade

THE reviewing officer at the graduation parade of No. 54 Entry and No. 5 (E and S) Entry at R.A.F. College, Cranwell, was General Sir Gerald Templer, K.C.B., K.B.E., C.M.G., D.S.O., A.D.C.

Contrary to the usual practice of holding a prize distribution in the gymnasium, General Templer presented the Sword of Honour, the King's Medal and the Medal of Honour on the parade ground, after which he addressed the assembled Cadet Wing.

The prize winners of these two Entries were: Sword of Honour, F/Cdt. U/Off. J. M. A. Parker; King's Medal, F/Cdt. Sgt. C. H. Foale; Medal of Honour, F/Cdt. U/Off. K. F. E. Mallett; Philip Sassoon Memorial Prize, F/Cdt. Sgt. B. C. Mills; R. M. Groves Memorial Prize, F/Cdt. Sgt. W. F. Nuthall; Dickson Trophy, F/Cdt. Sgt. A. M. Christie; J. A. Chance Memorial Prize, F/Cdt. U/Off. R. P. J. King; A. G. Fellowes Memorial Prize for Aeronautical Science, Sen. F/Cdt R. H. Robson; Air Ministry Prize for Imperial and War Studies, Sen. F/Cdt. D. A. Cooper; Air Ministry Prize for Equipment Subjects, F/Cdt. Sgt. A. M. M. Howes; Air Ministry Prize for Secretarial Subjects, Sen. F/Cdt. P. A. Hoskins; Royal United Service Institution Award, Sen. F/Cdt. R. H. Robson; Prince of Wales' Trophy and King's Squadron for 1952 Spring Term, "B" Squadron. Of 48 senior cadets on parade, 31 were from the 54th General Duties Entry and 17 from No. 5 Equipment and Secretarial Entry.

PRIZE-WINNERS: (Left) General Sir Gerald Templer presents the Sword of Honour to F/Cdt. U/Off. J. M. A. Parker. (Below) Front row: F/Cdt. U/Off. J. M. A. Parker, F/Cdt. Sgt. C. H. Foale, F/Cdt. Sgt. B. C. Mills, Sen. F/Cdt. R. H. Robson, Sen. F/Cdt. D. A. Cooper, and F/Cdt. Sgt. W. R. Nuthall. Back row: F/Cdt. U/Off. R. P. J. King, F/Cdt. Sgt. A. M. Christie, F/Cdt. U/Off. K. F. E. Mallett, F/Cdt. Sgt. A. Howes, and Sen. F/Cdt. P. Hoskins.

" "Flight" photographs

SERVICE AVIATION . . .

H.M.A.S. "Sydney" Busy

DESPITE rough seas, high winds and snowstorms, which hampered operations and replenishments, the carrier air group in H.M.A.S. *Sydney* (Capt. D. H. Harries, R.A.N.) has made a number of successful strikes on both east and west coasts of Korea.

While operating off the eastern side the aircraft spotted for the guns of H.M.S. *Belfast*, H.M.A.S. *Tobruk* and the Dutch destroyer *Van Galen*; in addition, air attacks were made on a variety of targets.

On the carrier's return to the west coast, attacks on enemy supply lines were continued. In one operation eight Fireflies destroyed four bridges for an expenditure of 16 bombs.

R.A.A.F. Joint School

A JOINT school for the training of both Navy and R.A.A.F. officers in anti-submarine warfare has been opened at the naval air station at Nowra, N.S.W. Special attention is to be given to this training, as it is expected that on the outbreak of a war the major task of the Australian Navy and Air Force would be directed against submarine activities.

Malayan Air Operations

IN November, following two months of comparative quiet, the Royal Air Force and Royal Australian Air Force in Malaya stepped up their activities against the bandits. Altogether 85 targets were attacked.

One of the most successful strikes was against a well-camouflaged camp in the state of Kedah. The occupants were taken by surprise and suffered heavy casualties; bomb craters pitted the camp area and rockets scored direct hits on huts and shelters.

Supply-dropping aircraft parachuted more than 150,000 lb of stores to ground troops and police patrols in the jungle.

Other activities of the Far East Air Force included patrols by Sunderland flying-boats based at Iwakuni in Japan, weather flights from Ceylon, and training flights and patrols by the fighter squadrons based at Hong Kong.

November was the last month of operations in Malaya by the Transport Squadron Detachment of the R.N.Z.A.F. This unit has returned home to re-equip with Bristol Freighters.

BUCKLING TO: Mr. Oliver Lyttelton, the Colonial Secretary, adjusts his safety belt before take-off in an A.O.P. Auster during his recent visit to Malaya. He was flying from Bentong Pahang back to Kuala Lumpur.

R.A.A.F. Basic Trainer

ANNOUNCING the adoption of the Commonwealth C.A.22 as a basic trainer, Mr. William McMahon, the Australian Minister for Air, said: "The C.A.22 will do the same job here as the Percival P.56 is to do with the R.A.F. Both aircraft are of similar design. The C.A.22 accommodates pupil and instructor sitting side-by-side in the front seat and a second pupil or passenger in a rear seat. A canopy which covers the three crew members is jettisonable. Pupil and instructor both have a full set of instruments."

With a 450 h.p. Wasp Junior engine the C.A.22 has a cruising speed of about 130 m.p.h. and its initial rate of climb is 1,200ft per min. All-up weight is 4,100 lb Two prototypes have been built, the first of which flew early this year.

PRESENTATION PIECE: Following the end-of-course dinner at the Empire Test Pilots' School on December 5th, Air Marshal Sir John Boothman presented the McKenna Trophy to the student who gained the highest marks on the course, F/L. J. K. Hough. Seated at left is Rear-Admiral E. M. C. Abel-Smith, whilst beneath the traditional mortar-board is G/C. A. E. Clouston, Commandant of the School. In the left foreground is G/C. L. S. Snaith, Commandant from March, 1949, to December, 1950, and now C.O. Flying, R.A.E.

C.F.S. Magazine

A CONTRIBUTION from one Professor Jimmy Edwards enlivens the Christmas edition of the Central Flying School magazine—in fact, a festive air pervades the whole publication.

In the more serious part is the news that the Refresher Squadron has severed its connection with C.F.S. and is now adopted by No. 2 F.T.S. at South Cerney.

The news section also announces the intention to hold four-monthly conferences on flying instructional technique, dealing with the two phases—training up to wings standard and past wings standard. Initial conferences on each of these phases were opened by Air Marshal Sir Hugh Walmsley, A.O.C.-in-C. Training Command.

Service Ties

A BOMBER COMMAND tie has been designed and may be worn by anyone who is now serving in Bomber Command, or who served in it since its formation in 1936. The tie is of dark maroon silk, with the Bomber Command badge, worked in gold, superimposed at intervals. Arrangements have been made for the new tie to be stocked and sold by Gieves, Ltd.

A tie has also been designed for wear by those who are serving, or have served, or who have attended a course, at the R.A.F. Technical College. It has a background of hunting green with the head of Minerva, in old gold, superimposed at intervals.

Applications should be made to the Secretary, Technical College Fund, R.A.F. College, Henlow, Bedfordshire.

Some seven weeks ago Coastal Command also announced the production of a Command tie.

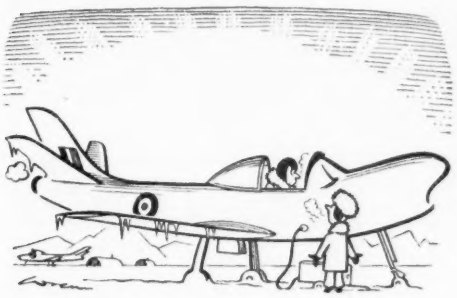
Service Fencing

THREE days, January 21st to 23rd, will be devoted to the R.A.F. junior champion-at-arms contest and the W.R.A.F. junior fencing championship at Cosford, Staffordshire.

Both competitions are arranged by the R.A.F. Fencing Union. The R.A.F. competition will be in the foil, épée, sabre and bayonet, and the W.R.A.F. in the foil only.

In Short . . . E.E.L.3

THE trouble with gas turbine engines is that they're so faddy about their lubricants. Honestly, the way some of them turn up their noses at a perfectly good mineral oil, even an "Esso" mineral oil, is positively revolting. You'd think, wouldn't you, that a nice drop of petroleum lubricant, laced of course with all the necessary—er—additives, would satisfy any engine. But no—not the aviation gas turbine engine. No, sir!



And why not?

Well, it's a longish story. You see, the aviation gas turbine is a pretty highly stressed piece of machinery and operates under the most exacting conditions of load, speed and temperature. It may have to start up from a ground temperature as low as –60°C., and restart in the air at something lower still (brrr!): so its lubricant must flow very easily and sweetly.

And when I remind you (*and* myself incidentally—funny how these little details slip the memory, isn't it?) that this lubricant can't really be thinned with fuel, as is customary with the piston engine, because turbine fuels, being much less volatile than ordinary juice, won't evaporate smartly enough to allow the lubricant to recover its normal viscosity as quickly as is needful . . . where was I? Oh, yes, sorry . . . when I remind you of all this you'll see that the gas turbine engine needs a rather special line in lubricants.

Starting up from cold is one thing: keeping going when overheated is quite another. Our gas turbine lubricant must also know how to deal with excessive degrees centigrade, how to smooth and keep on smoothing the work of the propeller reduction gears (with their high tooth loads), the bearings and so on, and how to avoid "leakage." By the way, the maximum temperature to which it is subjected is round about 250°C.—in the bearing next the turbine disc.

In other words, our lubricant must be adequately viscous—or, if you want it straight from the shoulder, its viscosity-temperature characteristics must be quite exceptional and correspond to an ASTM slope of 0·54, whatever that means; it must exhibit the right flash point, pour point, heat stability and load-carrying ability; and it must, it goes without saying, lubricate.

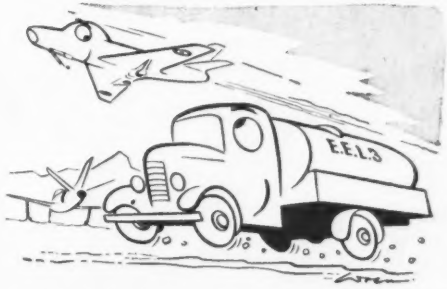
Well, that's a tall order, and it's not really surprising that ordinary mineral lubricants, even *ESSO'd* mineral lubricants, even *ESSO*-boosted mineral lubricants, should have fallen somewhat short of perfection.

Ah, but wait! Here's something new; a synthetic lubricant concocted by the boys in the bifocals and spotless smocks, the boys with the bulbous brows and receding hair-lines, the boys who forget their umbrellas and remember their onions.

It's being widely used in the latest types of gas turbine engines.

It's known by its code number.

It's E.E.L.3.



And I don't mind betting that at least one of those "E"s stands for ESSO.

Yes, I thought so—

It pays to say

Esso

FOR ALL PETROLEUM PRODUCTS

ESSO PETROLEUM COMPANY, LIMITED, 36 QUEEN ANNE'S GATE, LONDON, S.W.1

RIVETS & WASHERS
IN COPPER - ALUMINIUM - LIGHT ALUMINIUM ALLOYS,
& DURALUMIN. SPLIT COTTER PINS IN STEEL, STAINLESS
STEEL & NICKEL ALLOY NON-CORRODIBLE MATERIALS
D. POWIS & SONS LTD.
CONTRACTORS TO THE AIR MINISTRY, ADMIRALTY, Etc.
ESTABLISHED 1864
FORWARD WORKS, GOLDEN HILLOCK ROAD
SPARKBROOK BIRMINGHAM
TELEPHONE VICTORIA 1264-8 • TELEGRAMS POWIS, BIRMINGHAM.

DISCHARGE IN ONE MINUTE:—

3,000 GALLONS FOAM

5,000 CUBIC FEET CARBON DIOXIDE

The WALTER KIDDE COMPANY LTD. NORTHOLT, MIDDLESEX.
Telephone: WAXlow 1061

SUN ENGINEERING (*RICHMOND*) LTD. KINGSTON-ON-THAMES.
Telephone: KINgston 7407

Britain's

LARGEST FREIGHTER

built for the

MINISTRY OF SUPPLY

by **BLACKBURN & GENERAL AIRCRAFT LIMITED**

Safety in the Mines

For generations the homely canary has contributed to safety in the mines. In the air protection against fire is a more complex problem . . . and no single organisation has contributed so much to its solution as Graviner. Today, whilst happily called into use very rarely, Graviner systems, by their high degree of reliability, nevertheless play an important part in maintaining crew and passenger confidence. Continuous research into new and improved methods of fire detection and fire fighting ensures that new British aircraft now under construction will embody the highest degree of protection.

Safety in the Air

GRAVINER

Airborne **FIRE PROTECTION EQUIPMENT**

THE GRAVINER MANUFACTURING CO. LTD.
POYLE MILL WORKS, COLNBROOK, BUCKS. *Tel:* Colnbrook 48
G.R.2

ONCE dermatitis gets to work — hands are **soon out of work. Hands which are in constant contact with industrial irritants — solvents, and cutting or cellulose oils — need a constant safeguard. By acting as a barrier against dermatitis, Rozalex keeps all hands active on the job.**

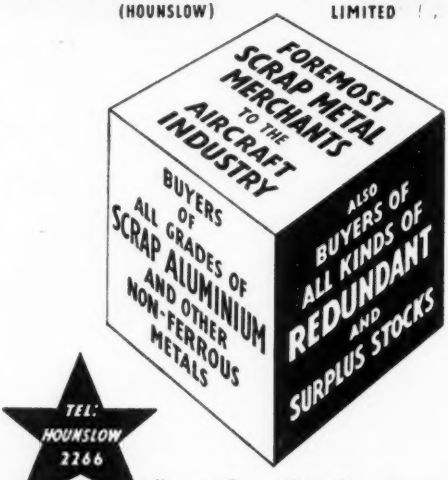
There is a type for every trade.

Send for free sample and leaflet "The Skin in Industry" to
ROZALEX LTD., 10 NORFOLK STREET, MANCHESTER, 2

ROZALEX

DERMATITIS BARRIER PREPARATIONS

R.J. COLEY & SON
(HOUNSLOW) LIMITED


FOREMOST SCRAP METAL MERCHANTS TO THE AIRCRAFT INDUSTRY
BUYERS OF ALL GRADES OF SCRAP ALUMINIUM AND OTHER NON-FERROUS METALS
ALSO BUYERS OF ALL KINDS OF REDUNDANT AND SURPLUS STOCKS

TEL: HOUNSLOW 2266

Keenest Prices - First Class Service

JUBILEE WORKS, CHAPEL RD., HOUNSLOW

Also at Park Wks., King St., Dukinfield, Cheshire. *Ashton-under-Lyne 3664*

Christmas and New Year Greetings

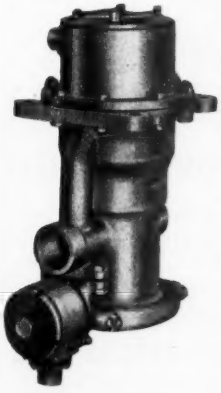
To our Many Friends

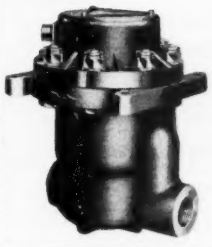
In the Industry

★

Hobson

H. M. HOBSON LIMITED, FORDHOUSES, WOLVERHAMPTON. *Licensees in U.S.A. and Canada: Simmonds Aerocessories Inc.*





Rate of Fuel Consumption

The Kent aircraft fuel meter is the only meter that provides a continuous record of quantity of fuel used per engine as well as an accurate indication of the rate of flow.

Three types are available to cover requirements of most aircraft:

(a) Medium capacity, low-pressure, for I.C. and turboprop engines, (b) high capacity, high-pressure, for insertion in the burner line of turbojet engines, and (c) high capacity, low-pressure, on the suction side of the engine driven pump of turbojets.

Important features:

(1) Proved semi-positive oscillating piston movement.
(2) Accurate over a wide range of flow, and over long periods without maintenance.
(3) Light, robust, compact, and easily installed.
(4) Able to withstand extremely high pressures if installed on the burner line in turbojet aircraft, or to pass large quantities of fuel with small head loss if installed on the suction side of the engine pump.
(5) Fitted with a by-pass to allow full flow under emergency conditions (low-pressure meters only).
(6) Operated with the minimum of power.

Most multi-engined British aircraft, civil and military, use Kent flow meters. A large and ever-increasing number of overseas users include:

Air India International, South African Airways, Qantas Empire Airways, Tasman Empire Airways, Canadair, Air France, Aer Lingus, Air Algerie, Air Maroc, F.A.M.A., and the Argentine Air Force.

GEORGE KENT

GEORGE KENT LIMITED . LUTON AND LONDON

Halls

AIRCRAFT FINISHES

APPROVED BY A.I.D. AND A.R.B.

are supplied to

THE BRISTOL AEROPLANE COMPANY LTD

and were used on the interior of the

'BRABAZON I'

★

JOHN HALL & SONS

(BRISTOL & LONDON) LTD., BRISTOL

Hengrove, Bristol, 4, and 1-5 St. Pancras Way, London, N.W.1.

Pressure Refuelling

More time in the Air . . .

Less time on the ground . . . with the

F.R. HIGH SPEED SYSTEM

FLIGHT REFUELLING LIMITED,

Tarrant Rushton Airfield, Blandford, Dorset. Tel. Blandford 501 Grams. Refuelling.

THE

BRITISH AVIATION

INSURANCE COMPANY LIMITED

UNDERWRITER & PRINCIPAL SURVEYOR

CAPT. A. G. LAMPLUGH

C.B.E., F.R.Ae.S., M.I.Ae.E.

HEAD OFFICE

3-4 LIME STREET, LONDON, E.C.3.

Telephone: Mansion House 0444

BRANCH OFFICES

MONTREAL
Room 201,
276 St. James
Street West.
Tel.: Lancaster 6125

JOHANESBURG
Room, 61,
London House,
Loveday Street.
Tel.: 33-3048

VANCOUVER
626 West Pender
Street.
Telephone:
Tatlow 2167

TORONTO
145, Yonge Street.
Telephone
Adelaide 3221-2

CALCUTTA
2 Hare Street.
Telephone:
Bank 6237

BRUSSELS
99 rue de la Loi.
Telephone
123965

leading aircraft
incorporate
ELECTRIC EQUIPMENT
by

B
T-H

Whatever the type of aircraft, BTH can design and develop the complete electric power system and supply the appropriate equipment, including:—actuators, A.C. and D.C. motors and generators; motor-generating sets with electronic regulators; gas-operated turbo-starters; Mazda lamps, etc. With over fifty-four years' experience of the manufacture of electrical equipment, and extensive manufacturing resources devoted entirely to these products, BTH is in an unrivalled position to fulfil the needs of aircraft industry.

THE
BRITISH THOMSON-HOUSTON
COMPANY LIMITED · COVENTRY · ENGLAND
Member of the AEI group of companies
A 4246

A MERRY CHRISTMAS AND A PROSPEROUS NEW YEAR...

To all our Service and Commercial friends at Home and Abroad

from

R. B. PULLIN
& CO., LTD.

Phoenix Works, Brentford, Middlesex.

Manufacturers of

PRECISION GYROSCOPIC, ELECTRONIC AND ELECTRICAL INSTRUMENTS INCLUDING TURN AND SLIP INDICATORS, MAGNETIC RELAY SWITCHES, MOTORS, ETC.

and their Overseas Distributors in:

AUSTRALIA	National Instrument Pty., Ltd., Melbourne.
BELGIUM	Intair Limited, Antwerp 1.
CANADA	Field Aviation Co. Ltd., Oshawa.
DENMARK	Dansvia A/S, Copenhagen K.
HOLLAND	N.V. Transmark, Bussum.
NORWAY	A/S G. Hartmann, Oslo.
SOUTH AFRICA	Field Aircraft Services Africa Ltd., Germiston.
SWEDEN	Hugo Tillquist, Stockholm.

FLIGHT and AIRCRAFT ENGINEER

PRESS DAY—*Classified advertisement "copy" should reach Head Office by* FIRST POST THURSDAY *for publication in the following week's issue subject to space being available.*

CLASSIFIED ADVERTISEMENTS

Advertisement Rates. 4/- per line, minimum 8/-, average line contains 6-7 words. Special rates for Auctions, Contracts, Patents, Legal and Official Notices, Public Announcements, Tenders 5/- per line, minimum 10/-. Each paragraph is charged separately, name and address must be counted. All advertisements must be strictly prepaid and should be addressed to FLIGHT Classified Advertisement Dept., Dorset House, Stamford Street, London, S.E.1.

Postal Orders and cheques sent in payment for advertisements should be made payable to Iliffe & Sons, Ltd., and crossed & Co.

Trade Advertisers who use these columns regularly are allowed a discount of 5% for 13, 10% for 26 and 15% for 52 consecutive insertion orders. Full particulars will be sent on application.

Box Numbers. For the convenience of private advertisers Box Number facilities are available at an additional charge for 2 words plus 1/- extra to defray the cost of registration and postage, which must be added to the advertisement charge. Replies should be addressed to "Box 0000, c/o Flight," Dorset House, Stamford Street, London, S.E.1.

The Publishers retain the right to refuse or withdraw advertisement at their discretion and do not accept liability for delay in publication or for clerical or printer's errors although every care is taken to avoid mistakes.

AIRWORK LIMITED

have been granted exclusive rights of sale for the fleet of four Doves being disposed of by Central African Airways.

With the sale of each Dove must go a percentage of spares consisting of engines, spare propellers, power plants, together with a large holding of engine and aircraft spares.

Particulars and prices from

AIRWORK LTD.,
15 Chesterfield Street,
London, W.1.

Telephone : **GROS. 4841.**

AIRCRAFT FOR SALE

W. S. SHACKLETON, Ltd., 175 Piccadilly, London W.1 (20 years at this address and 119 distinct types of aircraft sold), Europe's biggest aeroplane dealers, send CHRISTMAS AND NEW YEAR GREETINGS to our friends all over the world.
May you have tail winds both ways, green lights at all crossings and may all runways lie into wind.
May your heart and your engine never miss a beat.
May 1952 be a bumper year for you—Happy, Peaceful and Prosperous, and may your forms be less difficult to fill in than ours!
Finally, may we wish ourselves—poor pedlars of Percival Proctors—a reasonably good 1952 too? Thank you!
W. S. Shackleton, Ltd., have a considerable number of planes actually in stock. C.I.F. quotations to overseas ports gladly.

£650 PROCTOR V, long-range tanks and dual, under 200 hours since new. New C. of A.

£ LIST PRICE, AUSTER AIGLET. Now building at the makers. Early delivery.

£1195 AIGLET, our own well-known demonstrator. New C. of A. by Austers. Under 50 hours since new.

£???? AUTOCAR. Offers wanted. Austers very latest 4-seater. Brand new in October 1951 and under four hours total flying. Many extras. This plane was bought before the recent price increases. A virtually brand new aeroplane at some hundreds of pounds off list price.

W. S. SHACKLETON, LTD., now offer end-of-season bargains, both with new C. of A. and in quite exceptionally good condition.

£220 B.A. MARK II SWALLOW. Cirrus Minor engine, just completely overhauled by the Blackburn Aeroplane Co.

£275 MOTH MINOR, under 300 hours since new. Dual controls, immaculate.

£295 PROCTOR III. A full four-seat, leather upholstered, complete with Murphy VHF. Current C. of A. and very low engine hours. Finished in silver and red.

WHY do we give aeroplanes away?

W. S. SHACKLETON, Ltd., 175 Piccadilly, London W.1. Tel.: Regent 2448/9. Overseas Cables: "Shackbud, London." (0070

FIELD AIRCRAFT SERVICES, LTD.
Offer
"COMPREHENSIVE AIRCRAFT SERVICE"

AIRCRAFT
We can offer immediately a wide selection of aircraft. Let us know your requirements.

ENGINES
We offer fully overhauled Pratt and Whitney series 1830-90D, 90C and 92 engines at nil hours—test time only. Fully guaranteed and released to A.R.B. requirements, engines enclosed in cocoon plastic coat for shipment overseas.

SPARES
We have considerable stocks of engine and airframe spares of all types available for immediate re-sale at competitive prices.

AND
A competent staff to assist you in the location of spares which are in short supply.

FIELD AIRCRAFT SERVICES, Ltd., Croydon Airport, Surrey. Tel.: CROydon 7777. Cables: "Fieldair," Croydon. (0258

VENDAIR, CROYDON AIRPORT
OFFER
£1,350: Rapide, low engine and airframe hours with 12 months C. of A.
Open to offer: similar machine, without C. of A.
£775: Tiger Moth with 12 months C. of A.
£925: Choice of several Proctor aircraft.
VENDAIR
CROYDON AIRPORT, CROYDON 5777. (0603

All Black Leather fully lambswool lined

FLYING BOOTS

as illustrated, £5/19/6. Brand new zip front Brown Suede, fully sheepskin lined FLYING BOOTS, 9/6. HORSEHIDE GAUNTLETS, fully White Wool lined, Black or Tan, 5/6; super quality, 6/-. Sheepskin DRIVING GLOVES, 28/9. Brand new FLYING JACKETS, £7/15/-; slightly used, £6/15/-. White Silk INNER GLOVES, 6/6. Reversed Chamois INNER GLOVES, 12/6. Electrically heated INNER GLOVES, 10/6. Ex-Naval Woollen UNDER GLOVES, 5/9. Three-quarter length WATERPROOF JACKETS, warm Kapok lined, 57/6.
TERMS TO FLYING CLUBS. TRADE SUPPLIED.
SEND 3d. IN STAMPS FOR ILLUSTRATED CATALOGUE.

D. LEWIS LTD. (Dept. F)
Leather Clothing Manufacturers for Home or Export
124 GT. PORTLAND ST., LONDON, W.1
Trade Inquiries Invited.
Tel.: Museum 4314. Grams.: Aviakit, Wesdo, London

THE COMPLETE AERONAUTICAL SERVICE

EAGLE AVIATION LTD

Head Office:
29 Clarges Street, London, W.1
Phone : Grosvenor 6411
Cables : Speedlode, Audley, London
Maintenance and Operations:
Luton Airport, Luton, Bedfordshire
Telephone : Luton 5737

R.A.F. OFFICERS
UNIFORMS
NEW AND RECONDITIONED
LARGE SELECTION IN STOCK
FISHERS, 86/88 WELLINGTON ST., WOOLWICH, S.E.18 'PHONE: 1055

WYNSTRUMENTS LTD.

A. R. B. Approved
STAVERTON AERODROME
GLOUCESTER
Phones: Churchdown 3264 (3 lines)
Grams: "Wynn, Gloucester."

OVERHAUL, MODIFICATION TEST and CERTIFICATION FOR *of*

AIRCRAFT INSTRUMENTS

AIRCRAFT FOR SALE

AEROSERVICES (LONDON) LIMITED,
46, HERTFORD STREET, PARK LANE,
LONDON, W.1.
Telephone: GROsvenor 7378
Cables: AEROPAUL, London.

SEND sincere Christmas Greetings to all their customers and friends wherever they may be . . . at the same time reminding all that in our capacity as aeronautical consultants we shall be looking forward to your enquiries in the New Year. [0940

WOLVERHAMPTON AVIATION Ltd., Municipal Airport, Wolverhampton, offer for sale:—
TWO Aerovans, complete with radio, one C. of A. expired, one expiring 20.7.52. Long-range tanks. What offers?
HYDRAULIC Aircraft Lifting Jacks. 5, 10, 15 and 20 tons. Send for particulars.
WE have a large number of various types light aircraft for sale, why not let us know your requirements for 1952.
PHONE: Fordhouses 2191. [7429

R.
K.
DUNDAS, Ltd.

AT this time of the year we extend Christmas greetings to all our friends throughout the world. May you all enjoy good flying during 1952 in, of course, "Aeroplanes by Dundas."

R.
K.
DUNDAS, Ltd., 29, Bury Street, London, S.W.1.

WHI. 2848. Cables: "Dundassero, Piccy, London."

CROYDON AIRPORT. Cro. 0408. [0559

£750 CONSUL 6-seater. One of the few Consuls on the market. Full details from C.A.B., Ltd.
£200 B.A. SWALLOW. C. of A., etc. Full details from C.A.B., Ltd.
£475 AUSTER Mk V. Loads of extras. Full C. of A. Further details from C.A.B., Ltd.
£475 PROCTOR IV, four seats. Full C. of A. Further details from C.A.B., Ltd.

C.A.B., Ltd., offer the above aircraft. Details available from Central Aeronautical Bureau, Ltd., Croydon Airport, Croydon, Surrey. [7430

F. G. MILES, Ltd., wish to dispose of the company's own executive Gemini. Constructed for the managing director and maintained by the firm, this is the best flying Gemini ever. Details upon request.—F. G. Miles, Ltd., Redhill Aerodrome, Tel.: Nutfield Ridge 2322. [0580

MILES Messenger. First registered May 24th, 1951, built by Handley Page. Last Messenger to be built. C. of A. till May, 1952. Cirrus Major engine. Airframe and engine 40 hours. Four seats, upholstered brown hide, absolutely new condition. Price £1,250.—Keystone Garage, Ltd., Exeter Road, Bournemouth. [7399

AIRCRAFT ACCESSORIES AND ENGINES

DAKOTA engines for sale, ex stock:—
PRATT and Whitney 1830-92-90C-90D. Nil and part-time. Prices from £100, complete with mags., harness, etc., etc.
ALSO:—Fuel pumps, feathering pumps, hydraulic pumps, generators, starters, dynamotors, inverters, etc., etc.
WE are still the busiest Dakota dealers.

CENTRAL AERONAUTICAL BUREAU, Ltd., Croydon Airport, Croydon, Surrey. [7431
VENDAIR, Croydon Airport, offer:

£600 PRATT & WHITNEY 1830/92, nil hours.
£120 QUEEN II, nil hours.
£95 LYCOMING, 130 h.p., nil hours.

CHOICE of many other engines.
VENDAIR, Croydon Airport, Croydon 5777. [0607

SALE 100 radial 18-cylinder Pratt and Whitney aero engines, 2,000 h.p. Flight hours from 6-300.—D. M. Kott and Co., Hardmans Green Mill, Whitefield, near Manchester. [7425
AERO SALES, Inc., procurement specialists for all American aircraft, engines, accessories. Quotations furnished on all requests.—Address: P.O. Box 37, Miami International Airport Branch, Miami 48, Florida, U.S.A. London Agents: C. J. Fox and Sons, Ltd., 117 Victoria Street, London, S.W.1. Tel.: Victoria 0204/5. [0045
KODAK K24 aero camera spares, new, in original cartons. Over 270 cartons containing a total of approx. 9,000 various parts, for sale in one lot, £200. Stakon cable terminal tools, 10/-. Pilot's u/c. warning bells, 5/-. Quantity of American aircraft spares and servicing equipment.—Arthur Readman, 4, Park Street, Market Place, Stockport, Cheshire. [7407

AIRCRAFT ACCESSORIES AND ENGINES WANTED

GYPSY QUEEN 3 engine expired.—Box 5824. [7412

AIRCRAFT SERVICING

F. G. MILES, Ltd., Redhill Aerodrome, Surrey. Tel.: Nutfield Ridge 2200.
AN approved design, maintenance and repair organization staffed by experts on Miles aircraft. Major and minor modifications a speciality; radio installations.
APPROVED instrument test shop; specialists in race preparations.
F. G. MILES, Ltd., Redhill Aerodrome, Surrey. Tel.: Nutfield Ridge 2200. [0691
BROOKLANDS AVIATION, Ltd., Brooklands Aerodrome, Weybridge. C. of A. overhauls, modifications and conversions. Tel.: Byfleet 438. [0305
REPAIRS and C. of A. overhaul for all types of aircraft. Brooklands Aviation, Ltd., Civil Repair Service, Sywell Aerodrome, Northampton. Tel.: Moulton 2381. [0307

AIRCRAFT WANTED

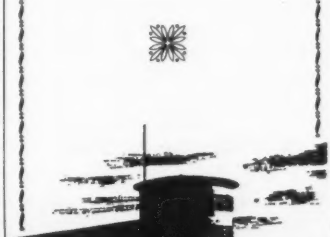
C.A.B., Ltd., are still in search of good, used aircraft. Machines bought and sold. Part-exchanges our speciality. Trade your plane for something new, something different.
CENTRAL AERONAUTICAL BUREAU, Ltd., Croydon Airport, Croydon, Surrey. [7432

Christmas Greetings 1951

The Directors and members of

AEROCONTACTS LIMITED

extend to their many friends in the Aircraft Industry, at home and overseas, their best wishes for Christmas, and may the New Year be a peaceful and prosperous one



AEROCONTACTS Limited
GATWICK AIRPORT, HORLEY, SURREY
TELEPHONE HORLEY 1510 CABLES AEROCON HORLEY

AIRCRAFT WANTED

W. S. SHACKLETON, Ltd., Europe's biggest aeroplane dealers are always looking for good aircraft to supply to clients all over the world, and would welcome offers of any type of aircraft, either for direct purchase, part exchange, or sale on commission.
W. S. SHACKLETON, Ltd., 175 Piccadilly, London W.1. Tel.: Regent 2448/9. [0071

CARAVANS

A CARAVAN FIRE!

ALAS, after a fireless year, two N.C.C. approved vans went up in flames on the same night. But the poor owners had some luck because they'd bought from U.K.'s largest caravan distributor with U.K.'s largest selection—all guaranteed *unconditionally* for a year with free-van-loaned for faulty one and all repairs free. Within twenty-four hours two brand new expensive vans were delivered free, and a cheque sent to one unfortunate to buy clothes. Of course, they can keep the vans free until all insurance claims are paid. Just part of our daily service. So why don't you buy from the firm that give you so *much* more—a larger selection and the only unconditional after-sales service. And the Caravan Residents' Association to help you get a site. Good h.p. terms and part exchanges too. Write for nearly 1 lb. of free advice articles and brochures to *Taplow* please! A. S. Jenkinson, Ltd., London Branch (equal selection—in fact, even better), 60, Oxford Street (corner Rathbone Place), W.1. 'Phone: Langham 5606-7. Open till 8 p.m. seven days a week. Head Office: Bath Road, Taplow, Bucks. Maidenhead 3434-5-6. Always open. Easy to reach—right on Main A4, outskirts Maidenhead, Taplow Station 4 mins. [0689
NEW "Statesman." £1,085. Other Berkeleys from £399/10/-. New Glider 4-berth de luxe, £389/10/-, and 2-berth, £212. Safari, £368. Towing. Hire purchase.—Mantles Garages, Ltd., Biggleswade. Tel. 2113. [0367
A MESSAGE for home-hunters. Ferraris of London, the home-maker, understands your problems. He has under one roof a second-to-none selection of the most-wanted caravans, is full of ideas for saving money and space, and has for immediate vacant possession your ideal home—just right for style, size and price. Send today for your free copy of latest illustrated brochure to:—
F. O. C. CARAVAN CENTRE, 200-220, Cricklewood Broadway, Edgware Road, London, N.W.2. Tel.: Gladstone 2234. Open daily 8.30-6 p.m.; Sundays 11-4 p.m. [0207

CLOTHING

R.A.F. officer's uniform for sale (new). Chest 40, inside leg 32. Call or write: Ellis, 50, Cowper Street, Leeds 7. [7420
R.A.F. and R.N. officers' uniforms purchased; large selection of R.A.F. officers' kit for sale, new and reconditioned.—Fisher's Service Outfitters, 86-88, Wellington Street, Woolwich. Tel.: Woolwich 1055. [0567

CLUBS

VENDAIR FLYING CLUB
CROYDON AIRPORT
is now operating one Tiger Moth and one Proctor. Require the services of an instructor at week-ends in exchange for free flying.
VENDAIR, CROYDON AIRPORT, CROYDON 5777. [0606

REDHILL FLYING CLUB, Redhill Aerodrome, Surrey, for instruction. Nutfield Ridge 2294. [0548
HERTS AND ESSEX AERO CLUB, Broxbourne Aerodrome, Nazeing, Essex. M.A.C. approved 30-hour course; solo flying from 30/- per hour; residential; trial lesson 25/-; train from Liverpool Street, or Green Line Coach 715.—Tel.: Hoddesdon 2453, 2421, 3705. [0230

CONSULTANTS

WING COMMANDER R. H. STOCKEN, F.R.Ae.S., Eagle House, 109, Jermyn St., London, S.W.1. Tel.: Whitehall 8893. [0419

HOTELS AND ACCOMMODATION

ROYAL OAK HOTEL, Keswick-on-Derwentwater, heart of English Lake District, offers restful holiday to Air Force personnel; first-class accommodation at reasonable charges. [0414

INSURANCE

ALL types of aircraft insurance and personal accident cover.—Apply to J. W. T. Amey, Messrs. R. J. Moffat and Co., Percy House, 796, High Rd., Tottenham, N.17. Tel.: Tottenham 2003-4-5. [0594

MISCELLANEOUS

"SKYHI" 10-5 ton aircraft jacks, model No. 8,854.
APPLY: The Brockmoor Foundry Co., Ltd., Brockmoor Brierley Hill, Staffs. [7381
600 UNUSED rubber aero tubes, size 17.50-10, cheap price to clear lot.—W. Farce, Ltd., 19, High Road, Chiswick, London W.4. CHIswick 2631. [7422
FOR sale. Quantity spares for Air Ministry wheel tractor by David Brown. Reduction gear boxes, etc. All brand new and unused. Send for list.—Wyllan Equipment Co., 37/39, Houldsworth Street, Manchester, 1. [7401

PACKING AND SHIPPING

R. AND J. PARKS, Ltd., 143-9, Fenchurch St., E.C.2. Tel.: Mansion House 3083. Official packers and shippers to the aircraft industry. [0012

TIME RECORDERS

STAFF item checking and job-costing time recorders (all makes) for quick cash sale; exceptional condition.—Box 7241. [0040
TIME recorders service rental. Tel.: Hop. 2239. Time Recorder Supply and Maintenance Co., Ltd., 157-159, Borough High Street, S.E.1. [7363

TUITION

SOUTHEND MUNICIPAL FLYING SCHOOL.
SOUTHEND-ON-SEA, Essex. Tel.: Rochford 56204. Private and commercial licences from £3 per hour or on contract from £2 per hour on Auster aircraft. Full night-flying facilities. Aircraft fitted with radio. No entrance fee, no subscription.—Write for full particulars. [0352
LEARN to fly for £24; instructors' licences and instrument flying to £3 an hour; night flying £3/10/- an hour; residence 44 gns. weekly. Approved M.C.A. private pilot's licence course.—Wiltshire School of Flying, Ltd., Thruxton Aerodrome, Andover, Hants. [0253
A.F.R.Ae.S., A.R.B.Certs., A.M.I.Mech.E., etc., on "no pass, no fee" terms; over 90% successes. For details of exams. and courses in all branches of aeronautical work, navigation, mechanical eng., etc., write for 144-page handbook free.—B. I. E. T. (Dept. 702), 17, Stratford Place, London, W.1. [0707

TUITION

SCHOOL OF NAVIGATION, University College, Wardsash, Southampton. Flight navigator's course £16/10/- for six months' tuition; pilot licences, £7/10/- to £13/10/- for six months' tuition; Link instruction; all approach systems, 10/- per hour or £3/10/- for ten hours; postal course; hall of residence. Tel.: Locks Heath 2161. [0557

COLLEGE OF AERONAUTICAL AND AUTOMOBILE ENGINEERING, Chelsea and Redhill Aerodrome. Diploma courses in aeronautical engineering combine full day workshop and technical training with coaching for R.Ae.S. Associate Fellowship examination. Parts 1 and 2, aircraft engineers, licences, etc., in preparation for executive positions. Syllabus from the College Secretary, Sydney Street, Chelsea, S.W.3. Tel.: Flaxman 0021. [0010

SITUATIONS VACANT

COVENTRY EDUCATION COMMITTEE
COVENTRY TECHNICAL COLLEGE

Principal: H. V. Field, B.Sc., Wh.Sch., M.I.E.E.

APPLICATIONS are invited for two full-time SENIOR LECTURESHIPS in the Mechanical Engineering Department, to commence duties as soon as possible.

CANDIDATES should be honours graduates or hold equivalent qualifications, and have had appropriate industrial or service experience, and preferably some teaching experience.

ONE post will be allocated to AERONAUTICAL ENGINEERING, and for this post candidates must have specialist knowledge of aerodynamics and either aircraft structures or engines.

FOR the other post the Education Committee is prepared to consider applications from persons having a specialist knowledge of either MECHANICAL or PRODUCTION or AUTOMOBILE ENGINEERING.

SALARY in accordance with the 1951 Burnham Scales for Senior Lecturers (£1,000 by £25 to £1,150).

APPLICATION forms and further information obtainable from the undersigned, to whom the completed forms should be returned within 14 days of the appearance of this advertisement.

W. L. CHINN,
Director of Education.
Council House,
COVENTRY.
November 27th, 1951. [7410

THE DE HAVILLAND AIRCRAFT CO. LTD.,
HAVE VACANCIES FOR
SENIOR DESIGN AND INTERMEDIATE DRAUGHTSMEN,
PREFERABLY WITH AIRCRAFT EXPERIENCE, IN THEIR HATFIELD AND LONDON (REGENT STREET) OFFICES

Applications, stating age, experience and salary required to:—
CHIEF DRAUGHTSMAN,
THE DE HAVILLAND AIRCRAFT CO. LTD.,
HATFIELD, HERTS. [0004

DRAUGHTSMEN
Senior, Intermediate and Junior (Over 23)
Required by
SHORT BROS. & HARLAND, LTD.
In Their Aircraft Drawing Office,
BELFAST.
Preferably With Aircraft Experience)
Applications, stating age, experience and salary required, to:—
Chief Draughtsman
SHORT BROS. & HARLAND, LTD.
QUEENS ISLAND, BELFAST. [7398

NORMALAIR, Ltd., Yeovil, Somerset, require:—
Designers
Draughtsmen
Technical Assistants
Technical Clerks
Technical Illustrators
Technical Writers.

FOR design, development, etc., of aircraft air conditioning and high altitude breathing equipment.

APPLICATIONS, giving age, experience, qualifications and salary required, to Personnel Officer. Local interviews arranged for selected applicants. [7254

VACANCY FOR KEEN YOUNG MAN WITH SOUND KNOWLEDGE OF INTERNAL COMBUSTION ENGINES, AS ILLUSTRATOR FOR SPARE PARTS SCHEDULE COMPILING TECHNICAL MANUAL, ETC., MUST BE ABLE TO READ MANUFACTURING DRAWINGS. GOOD OPPORTUNITY WITH LARGE CONCERN. CANTEEN, WELFARE, ETC.—WRITE TO THE PERSONNEL SUPERINTENDENT, BLACKBURN AND GENERAL AIRCRAFT, LIMITED, BROUGH, E. YORKS. [7391

PLANNING engineers required by large aircraft firm in the Midlands engaged on attractive and progressive programme of work. Previous aircraft experience desirable, but not essential. Interviews will be arranged locally where possible.—Apply, stating age, experience and salary, to Box 5772. [7400

SITUATIONS VACANT

VICKERS-ARMSTRONGS, Ltd. (Aircraft Section) have vacancies at Hurn Airport for the following staff:
AIRCRAFT STRESSMEN
JIG AND TOOL DRAUGHTSMEN
(aircraft experience preferable, but not essential).
APPLY, in writing, to the Employment Manager, Vickers-Armstrongs, Ltd. (Aircraft Section), Weybridge, Surrey. [7327

HANDLEY PAGE, Ltd., have vacancies for:—

AERODYNAMICISTS of degree standard or with H.N.C. in aero subjects. Previous experience preferred.

WIND tunnel technicians of degree standard or with H.N.C. in aero subjects. Previous experience preferred.

STRESSMEN of degree standard or with H.N.C. in aero subjects. Previous experience preferred.

WEIGHTS control engineers with minimum qualifications of O.N.C. Previous experience preferred.

SENIOR design and intermediate draughtsmen, preferably with aircraft experience, for Cricklewood and Radlett offices. Consideration will be given to applicants with experience in light structural or mechanical engineering. Possession of I.N.C. or H.N.C. (Mech. or Elect.) an advantage.

LOFTSMEN with previous experience of full scale layout work or similar workshop practice.

TECHNICAL authors, preferably with experience in the preparation of maintenance manuals, pilots' notes, technical specifications, etc.

TECHNICAL illustrators with previous experience in aircraft work.—Write, stating age, qualifications and details of experience, to: Staff Officer, Handley Page, Ltd., Cricklewood, London, N.W.2. [7211

WESTLAND AIRCRAFT, Ltd., Yeovil, Somerset, require:—

SENIOR, intermediate draughtsmen and stressmen.

APPLICANTS should state age, experience, qualifications and salary required, to the Personnel Officer. [7253

ELECTRICAL and radio draughtsmen required.—Apply, Employment Manager, Vickers-Armstrongs, Ltd., (Aircraft Section), Weybridge, Surrey. [7329

APPLICATIONS are invited for the appointment of works manager of an aircraft overhaul conversion works in the Midlands.

ONLY applicants with a proved high standard of administrative ability, experience in production control and workshop practices will be considered.

THE works employs some 300 personnel, and in addition to its main business of aircraft repair and conversion it undertakes component production in its ancillary detail and machine shops.

SALARY will be commensurate with experience and qualifications.—Please reply fully, giving age, experience and qualifications, which will be treated in utmost confidence. Previous applicants need not apply. Box No. 45, Allardyce Palmer, Ltd., 109, Kingsway, London, W.C.2. [7411

JUNIOR or intermediate draughtsman required, age 22 or 23 years, for detail design work on aircraft passenger and crew chairs. A.E.S.D. minimum rates.

APPLY: L. A. Rumbold and Co., Ltd., Kingsgate Place, Kilburn, N.W.6. [7403

JIG and tool draughtsmen required. Previous aircraft experience not essential.—Apply, Employment Manager, Vickers-Armstrongs, Ltd. (Aircraft Section), Weybridge, Surrey. [7328

WANTED, Draughtsmen-aircraft. Three seniors required with experience of fuel systems preferred. Knowledge of rubber an advantage. Write, stating salary and qualifications.

FIREPROOF TANKS Ltd., The Airport, Portsmouth. [7423

AIR traffic control officer required for Redhill Aerodrome.—Applications to Flight Inspector, Redhill Aerodrome, Surrey, stating qualifications, age and salary required. [7428

APPLICATIONS are invited from design draughtsmen and stressmen; also technical assistants with combined design and performance experience for work on both reciprocating and gas turbine aero engines.

APPLICATIONS should state full particulars of experience and qualifications, and should be addressed to The Personnel Manager, The de Havilland Engine Co., Ltd., Stonegrove, Edgware, Middx. [0575

AVAILABLE EX STOCK FOR IMMEDIATE DELIVERY

Air Speed Calibrators, Vacuum Indicators, Vacuum Chambers, Mercury, Vacuum Pumps, Manometers, "U" Tubes etc.

Staravia
BLACKBUSHE AIRPORT
CAMBERLEY, SURREY
Phone: Camberley 1600

SITUATIONS VACANT

APPLICATIONS are invited for the following positions in the Aircraft Division of the English Electric Co., Ltd., at Warton Aerodrome, near Blackpool.

(1) ENGINEER for the design and development of a new supersonic wind-tunnel project. Applicants should have good experience of this type of work. Degree or equivalent preferred. (Ref. 952.)

(2) ENGINEER for flight test liaison with the South of England. Applicants should have technical experience in the aircraft industry and have an honours degree in engineering or its equivalent. (Ref. 953.)

(3) ENGINEERS for aero-elastic and allied investigations. Applicants should have aerodynamic or structural training and experience. (Ref. 4395.)

(4) ENGINEER MATHEMATICIAN for investigations into mechanical methods for aerodynamic and allied calculations. Applicants should be graduates of first-class mathematical ability. (Ref. 954.)

PLEASE write, giving full details and quoting appropriate reference to English Electric Co., Ltd., Central Personnel Services, 2430, Gillingham Street, London, S.W.1. [7405

LICENSED radio engineer and radio mechanics at our base at Stansted Airport, Essex.—Apply by letter or telephone, to the Senior Radio Engineer, Aviation Traders Ltd., Southend Airport, Essex. Tel.: Rochford 56491. [0050

JIG and tool draughtsmen required, fully experienced.—Applications, in writing, to Personnel Manager, Percival Aircraft, Ltd., Luton Airport, Beds., stating age, experience and salary required. [0056

GLOSTER AIRCRAFT Co., Ltd., have vacancies for senior jig and tool draughtsmen.—Write, giving full details of previous experience, age and salary required, to Employment Officer, G.A.C. Ltd., Hucclecote, Glos. [7396

AIRCRAFT fitter assemblers required by de Havilland Aircraft Co., Hatfield. Good working conditions, modern equipment, superannuation scheme, opportunities for advancement.—Apply in person or by letter to Personnel Manager, or telephone Hatfield 2345. [0930

TECHNICAL assistant required to take charge of new laboratory in Bedfordshire, for physical testing of materials to British Standard specifications.—Applications, stating age, qualifications, experience and salary required, to Box 5813, quoting reference S.2. [7408

TECHNICAL authors required for compilation of spare parts catalogues. Ex-R.A.F. or Fleet Air Arm personnel with maintenance experience an advantage.—Apply, giving full details of experience, to Personnel Manager, de Havilland Aircraft Co., Hatfield. [7394

TECHNICAL authors and illustrators required. Knowledge of M.o.S. procedure desirable.—Applications, in writing, stating age, experience and salary required, to Personnel Manager, Percival Aircraft, Ltd., Luton Airport, Beds. [0094

ROLLS-ROYCE (Motor Car Division) have immediate vacancies for design and detail draughtsmen. Salary according to age, experience and qualifications; with excellent prospects.—Apply immediately to The Personnel Manager, Pym's Lane, Crewe. [7418

SENIOR and junior weight engineers required. Interesting work on new projects. Permanent positions offered to suitable applicants.—Apply, stating age, experience, qualifications and salary required, to Chief Designer, Gloster Aircraft Co., Ltd., Witcombe, Glos. [0912

GLOSTER AIRCRAFT Co., Ltd., have vacancies for fully experienced aircraft structural and electrical draughtsmen.—Applications, in writing, stating age experience and salary required, to Employment Officer, Gloster Aircraft Co., Ltd., Hucclecote, Glos. [0916

LIMITED vacancies exist for radio, electrical and instrument engineers with experience on heavy aircraft. Licensed men preferred, but unlicensed will receive consideration.—Apply, Chief Engineer, Fairflight, Ltd., Blackbushe Airport, Camberley, Surrey. [7304

SURREY FLYING SERVICES, Ltd., urgently require aircrew for "Yorks" aircraft, flight navigators. Radio officers must be in possession of current licences. Corporation rates of pay.—Apply by letter or 'phone, Surrey Flying Services, Ltd., 78, Buckingham Gate, S.W.1. Tel.: Whitehall 0056. [0651

AIRCRAFT estimator required, fully conversant with general construction and preferably already employed in similar capacity. Applications, in writing, to Personnel Manager, Percival Aircraft, Ltd., Luton Airport, Beds., stating age, experience and salary required. [0598

SKILLED bench and detail fitters for new manufacturing process with excellent prospects. High rates of pay to right type of personnel, prepared to accept responsibility. Canteen facilities and transport from Redhill Station.—F. G. Miles, Ltd., Redhill Aerodrome, Nutfield Ridge 2322. [0581

APPLICATIONS are invited from senior and intermediate design draughtsmen, experience of aero engine design desirable but not essential.—Please write stating age and giving details of previous experience in chronological order to the Personnel Officer, The de Havilland Engine Co., Ltd., Stag Lane, Edgware, Middx. [0449

ONE male test laboratory assistant required. National Certificate standard and preferably 2-3 years' experience on design and analysis of mechanical tests.—Applications in writing, stating age, experience and salary required, to Personnel Manager, Percival Aircraft, Ltd., The Airport, Luton, Beds. [0667

DRAUGHTSMEN. Junior and senior draughtsmen wanted for tools drawing office of large Coventry engineering firm. Production covers wide range of products providing plenty of variety and scope. Good conditions and salary.—Apply, stating age, experience, etc., to Box 5649. [7373

TECHNICAL assistants, both junior and senior, required in mechanical engineering department for work of national importance in connection with development of gas turbine engines. Excellent prospects exist in sections dealing with rig test of engine components, vibration, static structure test and research in gears and bearings. Qualifications: degree or H.N.C.—Apply: Reference No. VI, Armstrong Siddeley Motors, Ltd., Coventry. [0952

SITUATIONS VACANT

TWO draughtsmen are urgently required by engineering firm of repute in the North West district for plant maintenance work. Applicants must have good knowledge of I.C. engine test equipment, also be capable of carrying out designs on their own initiative. Salary according to age and experience.—Apply: Box 5823. [7419

RADIO officers required for service with Sudan Airways, Khartoum. Excellent starting salary plus 25 per cent expatriation allowance and additional allowances according to size of family. Generous home leave.—Apply: Airwork, Ltd., Sutton Lane, Langley, Bucks. For the attention of the Overseas Division. [7404

H. M. HOBSON, Ltd., invite applications for positions in the drawing office as follows: designers, detail and modification draughtsmen, checkers, stressmen. The work is concerned with interesting projects connected with fuel metering equipment and hydraulic flying controls for aircraft.—Hobson Works, Fordhouses, Wolverhampton. [0420

DRAUGHTSMEN and stressmen required by aircraft firm in the Midlands for work on research, aerodynamics and stress analysis.—Applications are invited from men with an aeronautical or mechanical engineering degree or equivalent qualifications. The positions offer good prospects.—Apply, stating age, experience, etc., to Box 5559. [7355

JIG and tool draughtsmen (age 25-35) required by manufacturers of automobile and aircraft accessories in South Midlands. Practical experience in toolrooms and production shops and good technical qualifications essential. Salary according to ability. Single accommodation available. State salary, age and full particulars.—Box 5771. [7338

PLANNER ratefixers, inspectors, engine fitters, airframe fitters, electricians, progress chasers, draughtsmen, radio mechanics.—Apply in writing stating experience and qualifications, licences held if any to Personnel Manager, Lancashire Aircraft Corporation, Bovingdon Airport, nr. Hemel Hempstead, Herts. Excellent rates and prospects. [7415

AIR SERVICE TRAINING, Ltd., require Category A flying instructor for transport pilot conversion duties at Karachi. Experience on Dakotas desirable. Salary approximately £2,000 per annum.—Applications should be made to The Commandant, Air Service Training, Ltd., Hamble, Southampton, marking letters and envelopes F.I.T. [7426

AIR SERVICE TRAINING, Ltd., require Category A flying instructor for fighter conversion duties at Karachi. Experience on Harvard, Fury and Tempest desirable. Salary approximately £2,000 per annum.—Application should be made to The Commandant, Air Service Training, Ltd., Hamble, Southampton, marking letters and envelopes F.I.F. [7427

JUNIOR and intermediate draughtsmen and one junior tracer required for experimental and development work of an interesting nature: aircraft experience not essential. Good prospects and conditions of employment. —Write, stating qualifications and salary required to: Personnel Manager, Flight Refuelling Ltd., Tarrant Rushton Airfield, Dorset. [7416

DOWTY EQUIPMENT, Ltd., Aircraft Hydraulic Engineers, Arle Court, Cheltenham, require a senior technical writer used to engine work, also detail and senior design draughtsmen. Excellent environment and working conditions. Pension scheme.—Write, Personnel Manager, giving details of training and experience, also mentioning age and salary expected. [7356

EXPERIENCED stressman required, for responsible position in stress office. Minimum requirements H.N.C. (or equivalent), several years' experience, ability to take charge of stressing of complete aircraft.—Applications, in writing, to Personnel Manager, Percival Aircraft, Ltd., The Airport, Luton, Beds., giving details of training, experience, age and salary required. [0998

DRAUGHTSMEN. Vacancies exist for first-class men in the jig and tool, also design and loft departments. Those with aircraft experience preferred, but others with good mechanical and structural knowledge welcomed. Limited single board accommodation available.—Apply, in writing or in person, to the Labour Manager, Fairey Aviation Co., Ltd., Heaton Chapel, Stockport. [7352

ILFORD, Ltd., require architectural assistants capable of work up to intermediate standard R.I.B.A., and experienced in industrial construction work. Five-day working week with pension scheme and staff canteen in operation. Applications in writing, giving age, training and experience, to Chief Staff Architect, Ilford, Ltd., Romford, Essex. [7311

TECHNICAL assistants required to work on design and analysis of static and dynamic rig tests in connection with guided missile project in South Bedfordshire area. Applicant should possess H.N.C. and have had 2 to 3 years' experience on structure testing.—Applications, stating age, qualifications, experience and salary required, to Box 5814, quoting reference S.3. [7409

TECHNICAL assistant required for weight control officer. Ordinary or Higher National Certificate preferred, knowledge of engine stress calculations desirable. —Please write, stating age and giving previous experience in chronological order, to: The Personnel Officer, The de Havilland Engine Co., Ltd., Stag Lane, Edgware, Middlesex. [7380

THE GLOSTER AIRCRAFT CO. requires senior and intermediate stressmen to work on designs and projects of advanced interest. Excellent prospects of advancement for sound and energetic men.—Apply, in the first instance, giving full particulars of technical qualifications, age, experience and salary required, to The Chief Designer, Gloster Aircraft Co., Ltd., Hucclecote, Glos. [0911

AIR FORCE, Naval, civil and helicopter aircraft all under design and development at Percival Aircraft, Ltd. Applications are invited from senior and junior draughtsmen, and stressmen, for work on this interesting programme.—Write, giving details of experience and salary required, to Personnel Manager, Percival Aircraft, Ltd., Luton Airport, Luton, Beds. [0986

A WELL-KNOWN company engaged on gas turbine development in London and north-west England has vacancies for technicians of all grades. Designers, aerodynamicists, performance engineers and draughtsmen wishing to be considered for these interesting positions on work of national importance, should write with all particulars, quoting Ref. HIC, to Box 5506. [7325

HANDLEY PAGE (Reading), Ltd., The Aerodrome, Woodley, Reading, have a vacancy in their Design Office for a senior stressman with good experience and a degree or Higher National Certificate with endorsements in aeronautical subjects. Also required is a qualified weights control engineer to take charge of small weights section.—Please send full particulars to the Personnel Officer. [0574

THE GLOSTER AIRCRAFT Co. requires the services of a number of aerodynamicists, (a) for design and project work, and (b) for flight test reduction. Opportunity exists for individuals to vary their experience within the Aerodynamics Department. Candidates with some years' experience preferred, but applications from juniors with sound mathematical ability will receive full consideration. —Apply, in the first instance, giving full particulars of age, experience and salary required, to The Chief Designer, Gloster Aircraft Co., Ltd., Hucclecote, Glos. [0913

AIRCRAFT & ANCILLARY SPARES

OVER ONE MILLION ITEMS IN STOCK

A.R.B. & A.I.D APPROVED

UNRELEASED SPECIFICATION SHEET METAL

	QUANTITY SHEETS
L.4	
Aluminium Sheet (Hard) 8 s.w.g.	
6ft x 3ft sheet	15
6ft x 2ft sheets	9
4ft x 2ft sheets	12
DTD.342	
Aluminium Alloy Sheet (Soft) 12 s.w.g.	
6ft x 3ft sheet	29
DTD.213	
Aluminium Alloy Sheet	
12 s.w.g. 7ft x 3ft sheet ...	133
6 s.w.g. 6ft x 2ft	71
8 s.w.g. 6ft x 3ft	31
8 s.w.g. 5ft x 3ft	1
6 s.w.g. 6ft x 3ft	11
L.16	
Aluminium (Half-hard) 1 s.w.g.	
6ft x 2ft sheet	4
STA7 AE	
Aluminium 11 s.w.g.	
6ft x 3ft	12
4ft x 3ft	1
DTD.390	
Aluminium Alloy (Heat-treated) 8 s.w.g. 6ft x 3ft	3
L.3	
Aluminium Alloy 4 s.w.g.	
6ft x 3ft	1
1ft x 3ft	1
6ft x 2ft	24
Aluminium Plate in ½	
6ft x 2ft 4in.	7
6ft x 1ft 4in	1
DTD.571	
Stainless Steel 18 s.w.g.	
8ft 4in x 3ft	73

AIRCRAFT, RADIO, ELECTRICAL, ETC. OVERHAUL, INSTALLATION AND MODIFICATIONS

All inquiries to:

AVIATION TRADERS LTD.
SOUTHEND AIRPORT
SOUTHEND-ON-SEA
ESSEX

Tel.: ROCHFORD 56491 (3 lines)

HAVE YOU OUR CATALOGUES?

H.O. 78 BUCKINGHAM GATE LONDON, S.W.1

Tel.: WHI 0056 (5 lines)

SITUATIONS VACANT

HANDLEY PAGE, Ltd., have vacancies for: (a) junior assistants, male or female, for work in their test houses at Cricklewood, on material and process control; (b) junior and senior assistants of H.N.C. or degree standard for work in their mechanical and structural test dept., at Radlett.—Write, stating age and full particulars of qualifications and experience, to Staff Officer, Handley Page, Ltd., Claremont Road, London, N.W.2. [7336

AIR SERVICE TRAINING invite applications for the post of an additional instructor in the school of aircraft engineering, for lecturing to students under training for aircraft maintenance engineers licences. Candidates should have previous instructional experience and be capable of lecturing to the standard of two or more of the following categories of aircraft maintenance engineers licence: "A," "B," "C," and "D."

APPLY: The Commandant, Air Service Training, Hamble, Hants, stating experience and qualifications. [7417

HANDLEY PAGE, Ltd., have a vacancy for a technical assistant with a good mechanical engineering background, who will be required to carry out investigations in connection with thermo-dynamic problems for aircraft air conditioning and thermal de-icing systems.—Write stating age and giving particulars of qualifications and experience, to Staff Officer, Handley Page, Ltd., Claremont Road, London, N.W.2. [7335

EXPERIENCED aerodynamicist required, for responsible position in aerodynamics department. Minimum requirements B.Sc. (or equivalent), several years' experience, ability to undertake all normal performance, stability and other aerodynamic work.—Applications, in writing, to Personnel Manager, Percival Aircraft, Ltd., The Airport, Luton, Beds, giving details of training, experience, age and salary required. [0990

VACANCIES exist for development engineers for work on auto control and servo systems. Applicants should be experienced in low-frequency electronic techniques, including the use of magnetic amplifiers. Preference will be given to applicants with previous experience in designing equipment to aviation requirements. Salary according to qualifications and experience. Please quote reference 3 EN. [7422

WRITE: S. Smith and Sons (England), Ltd., Bishops Cleeve, near Cheltenham, Glos. [7402

CHRISTCHURCH. The de Havilland Aircraft Co., Ltd., Airspeed Division, invites applications from experienced senior and intermediate stressmen for vacancies in an expanding stress office at Christchurch. Applicants preferably should have had experience in design stressing of high-speed aircraft from the project stage onwards.—Apply to Personnel Manager, The de Havilland Aircraft Co., Ltd., Airspeed Division, Christchurch, Hampshire. [7284

ARMSTRONG SIDDELEY MOTORS have a few vacancies for senior and junior stressmen to do work on strength investigations and calculations on gas turbine aero engines. Degree, Higher National Certificate or equivalent essential. This is work of prime national importance. There are also a few vacancies for senior and junior stressmen for work on the installation of gas turbines in aircraft.—Apply in some detail to Reference SJS.1. [0980

BRITISH EUROPEAN AIRWAYS have a vacancy for an analysis officer, male or female, at Northolt, to undertake analysis and solution of operational problems in navigation and aircraft performance. Minimum qualifications are sound knowledge of statistics and mathematics with university degree in either subject or equivalent. Salary scale £580 to £985 per annum.—Apply, in writing, to Personnel Officer, Flight Operation Department, B.E.A., Keyline House, Ruislip, Middlesex. [7424

GOOD opportunity for works manager with drive and initiative to take charge of works departments engaged on aero engine research and development. Applications are invited from men between 30 and 45 with previous experience on gas turbine and reciprocating engines. The position demands first-class experience in efficient operation of machine, sheet metal and assembly shops, as well as co-ordination of material supply, planning and the control activities on urgent "small batch" manufacture.—Details of qualifications and experience to Box 5531. [7343

A. V. ROE and Co., Ltd., invite applications for the post of deputy i/c. wind tunnel in their Aircraft Research Division at Woodford Aerodrome, Cheshire. Applicants should possess good academic qualifications, with a sound knowledge of applied aerodynamics, and should have had several years' experience of testing and analysis of results. Preference will be given to those possessing a knowledge of high-speed wind tunnels. The vacancy is on the senior staff and offers a good salary.—Applications should be made in writing, giving full details, to the Labour Manager, A. V. Roe and Co., Ltd., Greengate, Middleton, Manchester. [7409

ENGINEERS are required for the development of highly efficient test equipment in connection with the manufacture of automatic pilots and aircraft instruments. This work involves the application of electronic techniques over a frequency range from zero to approximately 100 Kc. c.p.s., together with light electrical and mechanical engineering. Applicants having experience of applied measurements in one or more of the above-mentioned engineering fields will naturally be preferred, but the foremost qualification is a sound appreciation of fundamental engineering principles. Salary according to qualifications and experience. Please quote reference 1 EN. [7423

SITUATIONS WANTED

EXPERIENCED airline captain and instructor requires situation overseas DC-4, DC-6 aircraft preferred. Married, family remaining in U.K. Available now. 2,000 hours on DC-4, 3,000 hours on DC-6. Current licences. Anxious join airline of repute for short term contract 2-3 years. Kindly questionnaire to Box 5822. [7413

WING COMMANDER, G.D., aged 35, permanent commission, wishes to leave Service to undertake more constructive work in civil aviation. 1,800 hours, qualified 4-engined types and Vampires; Green I.R., practical knowledge of aircraft engine and signals and radar; qualified R.A.F. interpreter in French and German, practical knowledge of two other European languages. Interested in administrative work flying, or combination of both. Willing to work abroad, preferably in Europe.—Box 5853. [7421

WANTED

MOBILE CRANE required. Diesel engine preferred. Must be modern.—Box 5369. [7289

CRANE wanted on caterpillar tracks, long jib. Diesel or petrol.—Box 5414. [7310

WANTED, V.H.F. radio for Gemini aircraft, 24 v., single or multi channel. No fancy prices.—Box 5770. [7397

A NUMBER of dinghies and life jackets are urgently required. Dinghies type J and life jackets type 47. Please state condition and price to Lancashire Aircraft Corporation, Bovingdon Airport, nr. Hemel Hempstead, Herts. [7414

BOOKS, ETC.

CARAVAN homes? See the January "Caravan," out 6 December 240th, for unique buyers' guide.—Order now from your newsagent, 9d., or by post, The Caravan, 2a Store Street, London, W.C.1. 1/-. [727

ROLLASON ENGINES LTD. CROYDON AIRPORT
TEL.: CRO 5151/4. *Cable:* ROLLAIR, CROYDON

SERVICING THE CHARTER OPERATOR

SPECIALISING IN:—OVERHAUL REPAIR AND MODIFICATION OF D.H. GIPSY QUEEN III AND CHEETAH X AERO ENGINES

JJH

STEEL STRIP

SHEETS AND SECTIONS
TO A.I.D. SPECIFICATIONS

HABERSHON
ROTHERHAM

The
British Air Line Pilots' Association
9-10 MARBLE ARCH, W.1
Tel.: AMBassador 1357

Membership open to all Commercial and Service pilots. For full details as to the objects and particulars of Membership please write to Secretary.

COTTON BAGS
FOR SPARE PARTS, Etc.
WALTER H. FELTHAM & SON, LTD.
Imperial Works, Tower Bridge Road,
Telephone: Hop 1784 **London, S.E.1**

AIRCRAFT SPRING WASHERS

CROSS MFG. (1938) LTD.,
COMBE DOWN, BATH

Jubilee

THE FINEST CLIP *in the world*

L. ROBINSON & CO., (GILLINGHAM) LTD.,
London Chambers GILLINGHAM KENT PHONE 5881

★ DELIVERY DATE NOW VERY CONSIDERABLY REDUCED

The perfect drawing board

The MAVITTA Drafting Machine stamps your drawing office as EFFICIENT. Made of steel tube with adjustable ball-bearings. The main angles are located automatically, intermediate angles by lock. Scales have inlaid celluloid edges and are divided to order on two edges.

THE MAVITTA DRAFTING MACHINES Ltd.
Highlands Road, Shirley,
Nr. Birmingham, England.
Telegrams: MAVITTA, Birmingham.
Telephone: Solihull 2231/2

MAVITTA DRAFTING MACHINES

Write for details of the new Major Machine for use on boards size 84" x 44" and upwards.

Printed in Great Britain for the Publishers, ILIFFE & SONS LTD., Dorset House, Stamford Street, London, S.E.1, by SUN PRINTERS LTD., London, and Watford, Herts. *Flight* can be obtained abroad from the following: AUSTRALIA AND NEW ZEALAND: Gordon & Gotch, Ltd. INDIA: A. H. Wheeler & Co. CANADA: The Wm. Dawson Subscription Service, Ltd.; Gordon & Gotch, Ltd. SOUTH AFRICA: Central News Agency, Ltd.; Wm. Dawson & Sons (S.A.), Ltd. UNITED STATES: The International News Co. Entered as Second Class Matter at the New York, U.S.A., Post Office.

Greetings
TO ALL OUR FRIENDS

A MOST USEFUL SEASONABLE GIFT

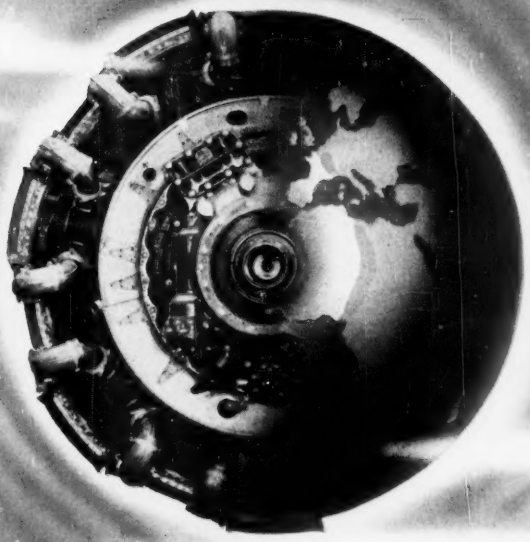
SCREENWASH. The 'Kigass' screenwash equipment now includes a new type spring loaded pump which gives a continuous 'wipe' with *six times* the volume of liquid that the previous model provided—an improvement rightly described as 'terrific' and 'magnificent' by those who have already tried it. Prices from £3. 3. 0 to £5. 5. 0, plus fitting charge. Ensure yourself clear screen vision in all weathers! FROSOL. Ensures a clear windscreen in all winter weather conditions. Price 2s. 6d. per bottle.

"QUICK and EASY" starting equipment; ensures instant starting in coldest weather. Price £3, plus fitting charge.

from

KIGASS
LIMITED

KIGASS LTD., 31, REGENT GROVE, LEAMINGTON SPA.
London: 28, SOUTH MOLTON STREET, W.1.



The ever-increasing number of

"Bristol" aero engines in service throughout the world is the result of 30 years of continuous progress in aero-engine design and construction.

Each major advance in "Bristol" engine design—from poppet-valve to sleeve-valve, from sleeve-valve to the new turbo-prop and turbo-jet projects now in course of development—has been the outcome of experience gained in air-line and air force operation in all quarters of the globe.

Bristol

963E

THE BRISTOL AEROPLANE COMPANY LIMITED · ENGLAND